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# **USSR** Report

NATIONAL ECONOMY



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# USSR REPORT

# NATIONAL ECONOMY

# EKO: ECONOMICS AND ORGANIZATION

# OF INDUSTRIAL PRODUCTION

No 8, August 1986

Except where indicated otherwise in the table of contents the following is a complete translation of the Russian-language monthly journal EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA published in Novosibirsk.

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#### SCIENTIFIC AND TECHNICAL PROGRESS REASSESSED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 8, Aug 86 pp 3-31

[Article by V. A. Bykov: "The Seagulls Over Pirita or Collective Thoughts About Scientific and Technical Progress"]

[Text] All of us--directors, scientists, journalists--were housed in the Olympic Center for Sailing near Tallinn. The place was called Pirita. A convenient work complex rose up in terraces on the shore of the gulf: a hotel, dining rooms, solariums and slips for the racing yachts. All this was like a snow-white ship with many decks that had dropped anchor and turned toward the sea. Also gathered here were participants in the All-Union Scientific-Practical Conference devoted to problems of scientific and technical progress. [Footnote 1]

It was in early spring, the lawns were clothed in the light fluff of the first green, but the ice was still crackling and sparkling in the gulf. The sun streamed into the wide windows, and seagulls flew over the gulf and the hotel. Thousands of birds, beautiful, but lazy and confident that they will be fed and not bothered. And only a few of them soared upward and floated like slow points in the blue Baltic sky.

We thought and argued and this was our work. We wanted to understand a great deal and help those who were working in the shops and offices and who had no time to think. Thousands of books about scientific and technical progress—alas!—did not exhaust the subject. The general schemes were good, but they did not give answer to many concrete questions. And we continued to search and argue, wishing to help both those who are employed in shops today and those who will be searching and arguing after we are through.

The seagulls flew shrieking over Pirita. They were also searching for something...and we recalled the eloquent parable of Richard Bach, a pilot and a writer, an offspring of the great composer, concerning a seagull named Jonathan Livingston. This was a fearless bird who in his quest for knowledge and speed of flight far outstripped his native flock and was driven away because of this; in other lands he achieved high knowledge and high mastery and returned to his native flock in order to rip off the veil of timidity and limitedness from the eyes of his fellow flock members and show them that all

of them are free to select a future, that they can fly at different heights and different speeds than they were used to, and they did not have to be glad about the pathetic crumbs of food but about the higher joys of life.

We have taken epigraphs from this parable story, and at the end of the article we have printed a short excerpt.

The 1980's: Again Life Throws Down the Cauntlet

"And he understood: Either fly at the highest speeds or spend the rest of his life in pursuit of rotten little fish ..."

It was too crowded within the given framework: from the level of the enterprise and the association the discussion shot upward: how in general does one evaluate today's economic situation? What is this—a natural alteration of victories and random failures? Or after the challenges of History itself during the years of the Revolution, the Civil War and industrialization today we have come up against the challenge of a new revolution—scientific and technical? If this is so, then this challenge is not regarding particular issues, but the main one: will we be able to restructure our thinking, our self-evaluation, and are our science, technology, management and prople ready for this?

"The attempt to make a direct, 'frontal' connection between expenditures on NIOKR and the number of people employed in this sphere, on the one hand, and the effectiveness of the economy of one country or another, on the other, as we know, have not produced any results," noted Professor V. F. Leontyev (State Committee for Science and Technology). "Through the customary concepts such as 'scientific policy' and 'technical policies' it has been necessary to add a new concept—'policy of innovations' or innovation science. Certain developed countries which did not understand this on time and did not restructure the interrelations between science and production are today setting themselves an extremely modest goal: merely controlling the degree of their backwardness. Such is the payment for complacency and self-satisfaction."

Shifting attention to the situation in our country, the speaker said: "We have 5,000 scientific research institutes, but if one were to look at them 'from above,' say, from the windows of the State Committee for Science and Technology, it would be clear that their efforts are dispersed: they have 5,000 volumes of scientific plans that are not very related to one another, but there is no unified plan for innovations for the country. Yet innovations are those procedures and means with which scientific discoveries are transformed into social and economic changes."

And such changes are critically needed.

"The current rate of the country's development cannot satisfy us," emphasized Academician A. G. Aganbegyan. "This is clearly stated in recent party documents. In order for people to live better, in order to solve problems of defense, in order to protect the natural environment—for all this we need high growth rates. We need resources, but the gross social product is the work of our hands and minds. The historic tasks—to realize the advantages of

socialism--requires work. We are now developing with an overall increase of approximately 3 percent per year. And the United States has the same rate. But our level of labor productivity is barely half of what it is in the United States. We need to develop with a rate of 5 percent annually--this is the demand of the time. The 12th Five-Year Plan should be a turning point. At this conference we should like to hear about possible ways of achieving this breakthrough at the level of the enterprises."

"Yes, the 12th Five-Year Plan is a turning point. And a most difficult one!" this spot was continued by a corresponding member of the USSR Academy of Sciences P. N. Belyanin. "I can firmly promise the directors gathered in this hall that it is not going to get easier. You will not get any more personnel: the next few years will be the peak of the demographic decline; raw material is becoming poorer and poorer and it will become more expensive; the processing of materials will become more complicated and the demands will increase; investments are limited and it is necessary to increase the rates. It is necessary! Life is throwing down the gauntlet to us and we must accept it."

Words Derived From the Word "Revolution"

"Jonathan saw with his mind's eye the immense flocks of seagulls on the shores of another time and with his customary lightness he sensed: No, they are not feathers and bones, they are the perfect embodiment of the idea of freedom and flight, its possibilities are unlimited..."

The scientific conference we are discussing took place in April of last year. In that same month at a plenum of the CPSU Central Committee one could hear the words: "In the majority of branches scientific and technical progress is slacking off, proceeding in an essentially evolutionary way.... We need revolutionary changes—a changeover to principally new technological systems, to the latest generations of technical equipment which provide the highest effectiveness."

Words like "revolutionary technologies," "revolutionary measures" and "revolutionary strides" flash before one's eyes in the press. These are very complicated words which involve a lot of responsibility. One must clearly understand how we arrive at them and what is concealed behind them.

Opening the conference, Academician A. G. Aganbegyan noted: "So far we are actually introducing evolutionary technologies and it is necessary to change over to truly revolutionary ones, which have integrity, flexibility, the ability to perform numerous operations, and reliability. Such technologies exist in each branch; but a great deal is needed in order to change over to them. It will be necessary to revise the investment policy, to triple the rates of renewal of fixed capital, to single out leading enterprises, to make them the ones that crystallize the latest directions in technical equipment and technology, and the very process of updating output must be made continuous.

Illustrating his suggestions with examples, the leader of the conference shared his impressions of the Ivanovo Machine-Building Association, the

Kherson Shipyard, and the Kuzbass Nagornaya Mine. The innovation of the approaches and the integrity of the technologies made it possible for these collectives to produce products that were quite capable of competing in the world market or to extract raw material with indicators that sharply exceeded the average ones for the branch. These collectives were headed by people of bold thought and high technical culture, talented people. Herein lies the difficult secret of their success.

"The time has come not to agitate and not to reorient the entire system of management for the utilization of revolutionary ideas in technical equipment and technology," declared Professor Yu. V. Yakovets of the Academy of the National Economy. "The problem is that there is a growing disparity between the word of science and the deed of practice. Scientific papers and reports are presented properly, but production does not notice them and does not change. Far from every scientific institution is capable of conducting basic research at the modern level—and one should not even ask for this. But everyone is capable of applied development—and they are the ones who should be called strictly to account. The general level of technical culture is very important. According to the reports each year we implement 700,000 to 800,000 measures for new technical equipment! But the final results show that a considerable proportion of these measures are radically outdated, that this is pseudoprogress, old ideas in new clothing."

Response: "But are there criteria for judging beforehand the progressiveness of measures? This is very difficult...."

Speaker: "It is difficult, but it is possible. We at the Academy of the National Economy, for Example, study the patterns and the changes from one generation of technical equipment to another"

Question: "Is it always necessary for generations to change? Modernization frequently turns to be more effective and less expensive."

Speaker: "There can be no single approach. Science and technology develop cyclically. There are periods of evolutionary accumulation of experience and ideas and there are periods of revolutionary transformations. They are objective and their alternation is determined not by appeals but by the logic of development. The reduction of rates is usually associated with transitional periods, slow advancement—with the evolutionary stage, and a leap—with the assimilation of principally new revolutionary technologies. Modernization is the fellow traveler of evolutionary periods and revolutionary changes usually require deep transformations of the technical base and the corresponding investments.

Response: "Everything you are discussing contradicts the existing economic mechanism."

Speaker: "The mechanism will improve as you know. Today we need an economic mechanism that is flexible, sensitive to everything that is new, and involved in continuous updating of production.

"The idea of continuous renewal as one of the basic qualities of production has been heard many times at the conference. And each time it has led to the speakers to an associated subject--monopolies and competition.

The current monopolistic position of the branches, head planning and research institutes, certain scientific schools and trends, and channels of communication and information, the lack of supervision of arbitrary decisions in the economic sphere—all this retards scientific—technical and social progress and makes it dependent on random circumstances, passions, stereotypes of thinking and group interest. The central press is dotted with evil articles about the bitter fate of inventors who are not "legitimately" recognized by organizations, institutions and individual officials who have the unlimited right to recognize or not recognize the capability of any creative person to give to people what he has created for the general good. Scientific and technical progress suggests that it is time to understand that there is no sphere of human relations in which, under the conditions of normal and long—term development, a monopoly would be useful or tolerable.

"Our magazine has written repeatedly about the alternative to the monopoly-competition."

"I consider that approach quite feasible," Dr of Economic Sciences Yu. I. Tychkov explained his viewpoint. "The Gosplan declares competition for the creation of a system of machines, say, or a forestry complex. A group of directors of machine-building scientific production associations is invited to participate. They are informed: of the possible allocations—800 million, the deadlines for submitting the technical and economic substantiation—6 months, the development—under the next five—year plan. Who is ready to participate in the competition? Three scientific production associations consider these conditions promising within a half a year, experts of the Gosplan consider the technical and economic substantiations that have been submitted. They select the most economical and reliable substantiation, the scientific production association receives a contract for 800 million, it looked for its own subcontractors, and so forth."

Response: "And will competitions also be declared for jackets and refrigerators? There are all those Apsherons running around in the stores-nobody will buy them...."

Speaker: "So they were thrown out the door--and accounted for. But large firms should be responsible both for sales and for services. A consumer evaluates their labor quite dispassionately--with the ruble. What is to be done with those who have not been able to stand up under the competition for effectiveness? Change management. We do not need just any old people, but talented managers.

"And the times demand that we should not shy away from strictness and irreversibility of sanctions against ineffective managers," the general director of the Leather Association in Kursk, candidate of technical sciences N. P. Pichugin supported this idea. "Our products go on the market and it has its own laws, which are merciless, like the laws of nature. There has been enough persuasion! The market judges who is working best and the market makes

it necessary to grasp onto scientific and technical progress. But to do this it is necessary to decisively change price setting and the conditions for management, for today the person who gets ahead in the branch is the worse and not the best. It is not advantageous to be an innovator, and noble appeals to rely on the latest technical equipment drown in absurdity."

The market...one should not place too much hope in it. But it is no accident that the general director spoke out so passionately about the laws of the market. And it is no accident that right after him the eminent representative of science, a corresponding member of the Academy of Sciences P. N. Belyanin, spoke out just as resolutely: "Today the director who does not think about the market," he said, "is hopelessly behind the times. It is necessary to train the mustles first on the domestic market in order tomorrow to enter the foreign market. Otherwise they will not grow: a person grows under a load!"

Questions were flung out at P. N. Belyanin. A market there is, but where is the developed mechanism and is such a thing possible? Does everyone need to enter the international market? Is science oriented toward this? Is it possible to speak about the planned nature of scientific and technical progress while developing market relations?

The answer to these questions could not be given within the framework of this report. The magazine will inevitably return, and more than once, to this most important subject of the socialist market and socialist competition—crowding out poor commodities with good ones and the unskilled managers with skilled and talented ones.

Jokes heard in the corridors from participants in the conference: "Are you a revolutionary in management or not?"--being conversations that were highly topical, they were continued by us EKO workers in the editorial mail. From this we have selected a letter from the head economist of one of the plants in Sevastopol, Candidate of Economic Sciences N. D. Lubyanov. He titled it "The Working Class in the Forthcoming Management Revolution." Having recalled that the Marxist prediction of the revolutionary transformation of the world became a reality as a result of the victory of the working class of Russia, the author emphasized that it was the working class that played the decisive role in the subsequent stages of socialism as well: the cultural revolution of the 1920's, the industrial revolution of the 1930's, the military-industrial revolution of the 1940's ("This is perhaps an unusual term," the author writes, but was it not revolutionary to change all of industry over to a military basis for several months!"). "Now under the conditions of the scientific and technical revolution," he continues, "we are making a big mistake if we decide that the changeover of the economy to the intensive path lies exclusively through engineering research and management decisions. This path is not new. By following it, for 11 years now the level of labor productivity of our industry is 55 percent of that of the United States--the statistical collections of the Central Statistical Administration report this each year, beginning with 1974. I think we have a right to say that this important indicator has gotten out of control to no small degree and that the existing system of management has for a long time not been able to overcome the negative tendencies. Hundreds of newspaper articles discuss the fact that the workers (including those on the most progressive machine tools and the

latest kinds of equipment), because of the imperfection of systems of norm setting and wages, artificially retard the productivity of their labor and do not give everything they can! In this connection the general interest in the brigade form of worker self-management is very instructive. It is remarkable. Without involving the workers—the major motive forces of society—in direct management of production it is impossible to solve the problem of sharply improving manageability or to radically increase labor productivity. Stories about brigades that have achieved the highest indicators in a short period of time are a clear confirmation of this. But putting an ever larger proportion of management problems in the hands of the workers themselves and giving them complete authority and responsibility for certain sections—this process should take place more deeply and more resolutely."

The revolutionary changes in technical equipment and technology earmarked by party decisions cannot take place without the same changes in the activity of the working class. When the country was experiencing immeasurably greater difficulties than it is now, V. I. Lenin wrote: "We have a 'miracle means' immediately, with one blow to increase our state apparatus tenfold, a means which no capitalist state has ever had or could have. This miracle means is the enlistment of the workers...in the daily work of managing the state."2 The simplicity of these words is deceptive. Management is certainly not the formula customary to us of "participation in management." Participation is not a compulsory thing: if I am in the mood I will participate, if not they will do without me. To participate means to advise, to suggest, simply to be in attendance at the adoption of decisions. To manage means to participate in the decision oneself, to engage in management labor, which is difficult and occurs every day. To participate is not too responsible: "Yes, I attended, but the supervisors could see more clearly.... To manage means to take on full responsibility: "Yes, we decided that." This responsibility should be taken on first by the councils of the brigades, then--of the shops, and so forth. And it is absurd to be afraid that some people will be incapable: the enlistment of engineers in the brigades is an indicator that the worker selfmanagement is able, when necessary, to rely on the knowledge of specialists. To rely. But to decide-for themselves.

Believing in the development of collective forms of labor organization, here is how the author of the letter turned the problem around. He is convinced that the many years of retardation in the growth of the productivity of public labor can be overcome only by activating the working class. Revolutionary changes in technical equipment and technology, as he sees it, are inseparably linked to changes in the motivation and position of the workers—the basic productive force of the society entering the age of the scientific and technical revolution in close alliance with science.

#### An Alliance of Two Elements

"'Forget about faith!' taught the elder. 'Did you need faith to learn to fly? You needed to understand what flight was. Now you must do the same thing. Try once again....'"

The selection of organizers of the conference in Tallinn turned out to be successful. An academician of the Estonian Academy of Sciences A. A. Kyeyerna

recalled that his republic holds one of the leading places in the USSR in terms of the per capita output of industrial products, exceeding the average union level by 40 percent. At the same time, during the past 2 five-year plans in Estonia the rates of introduction of new technological processes have dropped, the rates of renewal of the active part of fixed capital has slowed up, and the effect from each ruble of expenditures on technical improvement of production has decreased. An analysis conducted at enterprises of nine ministries show that the principle of the lack of uniformity of technical development operates randomly and is not utilized for priority formation of the leading areas and leads to a reduction of the growth rates of labor productivity in industry as a whole. The analysis showed also that the creation of mechanized flow lines and automated lines in and of itself does not mean an increase in effectiveness. The capacity of the former is utilized in the republic by an average of 46 percent, and the latter--by 53 percent. The reasons are the single-shift work schedule, shortages in supply and the unreliability of the lines themselves.

If one were to trace the sources of the aforementioned and many other shortcomings it would be easy to see the neglect of the advice of science which has extended over many years. Now the Estonian Academy of Sciences has earmarked a number of clear-cut approaches to strengthening ties with production. These include the development of an experimental design base of academic institutes which already have a scientific stockpile: in the area of microprocessor and laser equipment, biotechnology, instrument building and As a counterprocess there should be developed a designtechnological and experimental production base of the enterprises. So far numerous design bureaus and special design bureaus of ministries on the territory of the republic, which consume 77 percent of all the branch expenditures on science, do not deal very seriously with science as such and perform particular functions of the administrative staff of the ministries. Their reorientation is an immediate matter as is the coordination of their interests with the subject matter of experimental subdivisions of academic institutes. This countermovement of "science-production" should be maintained at all levels, emphasized Academician Kyeyerna. "Up to this point the republic's scientific potential has developed largely apart from the interests of production. The plant directors complained that they do not receive enough from science, and the institute directors complained that their developments are poorly applied in practice. Now we have conducted an inventory and we have, on the one hand, a complete list of problems that are being resolved by the scientists and, on the other, a list of problems that bother production. We are working on bringing them together. It is a difficult job because both systems are extremely inert, but we can see the most effective path."

Question: "But have you not forgotten about basic research?"

Speaker: "No, we have not forgotten. There are republics where academic science expends 60 percent of its efforts on work under economic agreements. We are more modest: the applied subject matter takes only 30 percent of our potential and 70 percent is work on basic research. We consider this proportion optimal for the Academy of Sciences."

The ties between science and production are primarily a unity of their interests.

The manager of the Estonian Marat PTO, A. Kh. Kapral reminded those in attendance of a parable. Having gathered at a conference (also a scientific one, according to them) some mice discuss their problems for a long time and came to the conclusion that everything would be all right if the cat did not bother them. He always appeared unexpectedly.... They decided to put a bell around the cat's neck! They enthusiastically discussed the effectiveness of this measure and calculated the advantage they would gain and how their mousy progress would advance to the heights....

"But who," one young mouse asked timidly, "but who will hang the bell around the cat's neck?"

"We will cross that bridge when we come to it!" his fellow mice waved him off, and continued their animated discussion of the advantages the bell around the cat's neck promised them.

"Science and production consider everything separately," continued the general director. Today it is economically disadvantageous for them to cooperate: they have different sources and systems of financing and different criteria for success. And this is that same "bell" which cannot be hung around the cat's neck during the course of work. As long as problems of deep mutual interest of science and production are not solved through the economic mechanism all forms of their cooperation will be compulsory in nature. Something will be accomplished this way, but we will not solve the cardinal problem of accelerating scientific and technical progress. We need scientific subdivisions within the enterprises (but not the creation of "paper" scientific production associations!). But limits? Maximum allocations? The number of engineering-technical and administrative personnel? Reporting?... Solve all of these problems and put the suppliers of raw material in a responsible position—and in 3 years our collective, which is already trading with the FRG and Finland, will be able to sell 85 percent of its products on the European market. They will be products that are quite capable of competing. We will solve all the other problems through our own efforts."

Question: "Perhaps you do not need the unified fund for the development of science and technology?"

Speaker: "But what good is this fund without limits? Everything else has limits!"

Question: "But what about the current system of trade?"

Speaker: "The wholesale bases are cutting out coupons. It is necessary to combine the production of consumer goods and trade. We sell 10 percent of our goods through the firm's store. Can this be the right scale?..."

Other participants in the conference discussed the unity of processes of production and sales. But let us leave the discussion of the union of production and trade and return to the union of production and science. To one of its contradictions.

The strengthening of purely economic interests based on "advantageousdisadvantageous" certainly does not quarantee a striving on the part of the enterprises for the latest scientific and technical achievements. Expansion of the independence of the enterprises does not quarantee their readiness for revolutionary changes either. Candidate of Economic Sciences E. B. Golond, an associate of the Institute of Economics of the Siberian Branch of the USSR Academy of Sciences, drew the attention of those in attendance to this important peculiarity of real management. Having cited a number of examples of a possible changeover from the existing technologies which have already been exhausted to technological systems of a higher level, he emphasized that such radical changes cannot be based solely on economic interests or solely on expanded rights of enterprises and associations. They require first of all centralized planning decisions. Hence an important and far-reaching conclusion: evolutionary development requires unconditional decentralization of management and expansion of the rights of enterprises, and it is possible on the basis of streamlining, invention and the demonstration of the initiative of labor collectives. Revolutionary transformations of production will also require a strengthening of centralized power which is capable of rising above the interests of the branch, association, and scientific school, coordinating the efforts of many departments and, if necessary, changing the conditions for their activity and the system of interrelations between science and production for the sake of achieving nationwide goals.

It should be noted that the categorical nature of this coordination of evolutionary and revolutionary paths of development with the strengthening of centralization or independence is not unquestionable. But at the conference this assertion did not elicit any open polemics over the idea of shifting the focus from the evolutionary path to the revolutionary one was discussed from many sides.

#### Pirouettes Around Archimedes

"The essence of the matter consisted in that Jonathan had to get rid of the idea that he was a prisoner of his own body with a wingspan of 42 inches and that he was limited to a set of previously programmed capabilities...."

Today's experience teaches us that an innovation introduced into extremely complicated production experiences the more resistance the more radical the degree of innovation itself. And one should not look for the reasons in the lack of awareness of the directors or the lack of understanding of the importance of innovations at some level of management. They are aware. Everyone understands. But production has its own laws. Not caprices, but laws! Like Archimedes.

"The more strongly we press for 'introduction,' the more resistance we receive from the environment," states Candidate of Economic Sciences A. Ye. Luzin from MGU. "You all recall attempts at innovations using purely forceful methods. It is the same thing...the pressure was sharp and general. The result was more than modest. A recent example is the 'universal' introduction of automated control systems. The agitation took place, but the results again

were fairly modest. Behind these phenomena is a pattern: each system, from the enterprise to the state, has a particular innovation potential, in other words, a capability of accepting the new. This capability must be known, and one must develop and operate within its limits.

The economic press, including EKO, has expended a good deal of effort on the thesis "motivate economically, and do not introduce by force." In other words, any progressive innovation should be advantageous to the party that is realizing it. It is typical that this thesis which is unquestionable in principle is tossed about, contemplated and chewed on mainly by scientists. Practical workers do not object, but they are in no hurry to put their hopes in economic methods. They live in a world that is predetermined by the plan and they have developed a "planned" disposition.

"The system of scientific and technical progress in the country must be developed as we develop instruments," recommends Candidate of Economic Sciences P. I. Radchenko, who represented one of Leningrad's scientific production associations at the conference.

"We should not call for progress, but plan t through Gosplan decisions," asserts the General Director of the Kaliningradtorgmash Production Association, E. G. Kuznetsov.

"The main thing is not to violate the rigid scale of updating products," concludes Candidate of Economic Sciences V. I. Livshits from Tomsk. "Well he has a right to say that: at the enterprise with which he works this schedule is a reality and the automation of small-series production of parts for machines and instruments has been described in detail3 and given a high rating. "Not so long ago," wrote the President of the USSR Academy of Sciences Academician A. P. Aleksandrov, 4 "at one of the plants of Tomsk I was introduced to a system created there for automating a large shop that has machine tools with numerical program control and a system for automating planning. And I understand that this is a real plant of the future, a prototype toward which we should be striving!" Participants in the conference saw a small film shot at the plant and we understood what the president of the academy was so excited about. Sharp looking transportation robots moved throughout the shop carrying parts between automated storehouses for blank pieces, instruments, fittings and prepared parts--and the groups of machine tools with numerical program control. This was a closed technological cycle. Everything was controlled from a computer. The film was short but it made a strong impression. With a small number of people, intelligently planned and carefully prepared through engineering thought, this shop hummed and clicked with automated machines and milled metal continuously, including during those minutes when one of the co-authors sitting at the round table of our conference said: Up to this point it is unrealistic to rely on the notion that the consumer will dictate the latest technical solutions to us. consumer is willing to accept outdated machine tools and turn away diamond instruments. We ourselves must include in the plans systematic and constant updating of the product. This is an objective process and we must not impede it, but assist it."

It was very pleasant to hear this calmly competent speech where there were no words about "extensive integration of science and production" but there were in fact deeds.

The same kinds of deeds stood behind the scanty words of Candidate of Technical Sciences Yu. P. Shelyukhin. "During the past 5 years we have not 'introduced' anything," he said, smiling. "Every new development is carried out as part of ordinary daily production. But science is always in first place: from the plant laboratories which we have moved to the territory of the Siberian branch of the Academy of Sciences to the placement of shop sections under the jurisdiction of laboratories of their own scientific research institutes with the formation of scientific production sectors—new structural units in the system of the scientific production association."

Our magazine has already written about the problems of the scientific production association. Iet us note that those productions which were discussed belong to ministries whose leadership has no alternatives: either they will rely daily on scientific and technical progress or, excuse my candor, they will be fired from their high positions.

But most productions are not placed in such rigid circumstances. Not every plant today can create technologically closed sections of machine tools with numerical program control, develop systems for group control of these from a central computer and take colored films of this. Not every collective creates instruments which have no analogues. Not every collective is publicly given work which is rated with the unambiguous word "irreplaceable." Most of the enterprises, we repeat, work and will work under conditions that are limited to extremely simple concepts: "This is possible for us," "This is promising," "This is advantageous." Therefore the process of updating should become universal, and the risk should be spread out.

"First of all the risk should be legitimized, it is an objective production category," said Professor A. S. Astakhov from the Academy of the National Economy at the conference. "It is necessary to have a risk fund. And in order for a manager to decide to take risks the evaluation and incentives for his actions should be done only according to national economic criteria. These criteria exist with respect to new technical equipment. These include the concept of adduced expenditures and the annual economic effect. They are legitimized and have undergone many years of verification, but they have not yet been included among the planned indicators. The enterprise generally does not know about them either in the cost accounting or in the systems of reporting. And if the effect from new technical equipment is manifested at other enterprises than the given one or other units of the national economy, the enterprise is not interested in whether this innovation is advantageous or not. Only by introducing into the system of cost accounting the indicator of the complete national economic effect and giving it the status of a planned and fund-forming indicator is it possible to motivate the enterprises to create new technical equipment. To motivate them, and not to "introduce" by force.

"From world experience," noted Candidate of Economic Sciences L. A. Konyreva (Institute of the United States and Canada of the USSR Academy of Sciences), "one can quite confidently draw the conclusion: in order to obtain new scientific and technical solutions it is necessary to encourage the right to disagreement, even the right to mistakes. Without this right people will never learn to fly!"

The Real Danger--A Cart With Numerical Program Control...

"What is the matter with them, Jonathan? What are they, blind? Can they really not see? Do they really not understand?..."

When you are faced with a mountain path there is always a temptation to look for an easier way around. Participants in the conference discussed this considerable danger.

- B. G. Gavrilov (Moscow, Automatic Heating Equipment Plant): "It would seem that it is easier and simpler to automate existing production. But this is an erroneous opinion. It is costly and ineffective to automate an outdated technological process or object that was developed for manual control."
- D. M. Palterovich (Moscow, Institute of Economics of the USSR Academy of Sciences): "It is necessary to prohibit under the conditions of none-grown technical equipment work with robotization which requires the highest culture. On the pages of the press one can already see fantastic figures about the number of robots we have in operation. Frequently these are primitive devices manufactured, in the apt expression of one of our scientists, in the nearest garden plot. One must not discredit one of the most progressive directions of technological process. The same danger awaits us with flexible automated productions...."
- P. N. Belyanin (Moscow, NIAT): "Today work in systems with numerical program control does not actually exceed a period of 35 hours before the first breakdown. This is an inadmissibly small amount of time. In order for flexible automated systems to be productive it is necessary for them to operate for 6,000-8,000 hours in a row. The joyous reports about automated equipment do not take into account the small load. All one has to do is put an automated machine tool on a three-shift work schedule and it begins to require constant repair jobs. Changing over to flexible production systems requires a multitude of radical decisions in the area of technologies, instruments, measurement equipment, software and retraining of personner. Without all this discussions of flexible automated productions and flexible production systems frequently sound like idle hopes...."

While seeing and recognizing the danger of a simplistic approach to problems of scientific and technical progress, participants in the conference emphasized that we must not just wait and see.

"Everyone talks about flexible automated productions: It is difficult and costly. But I intuitively feel that we must deal with them!"—these words of Yu. M. Kiselev from Novosibirsk could be repeated by many production leaders.

V. V. Potelov (Academy of the National Economy): "The flexible section for processing complicated body parts which I wish to discuss consists of two lines--an automatic one with six multi-operational machine tools and an automated one with eight machine tools of which five are processing centers. The operation of this flexible automated section has pointed up a number of principally unsolved problems: We have not envisioned automatic replacement of the instrument (each replacement by hand means 15 minutes of down time), cleaning up of the shavings from the cutting zone (each hand cleanup when replacing the accompanying adapters means 5 minutes of down time). repairing any machine tool the entire line is halted, as a result of which the average duration of repair jobs on the line is 3-4 times greater than the repair jobs for analogous equipment that is not built into a line. The amount of time worked by the Universal-60 before breakdown is 110 hours, and the average time to restore it is 4 hours. All this severely reduces the effectiveness of the line. The necessary flexibility of production can be provided only if the entire complex can quickly be readjusted for producing a new product: planning, technical and organizational preparation of production, and all basic and auxiliary equipment. Thus the flexible automated production requires the production of a unified system of ASUP-SAPR.

Question: "You have juxtaposed expenditures and results?"

Speaker: "The section has been in operation since 1981. It will pay for itself in 15 years, but this is for the enterprise. The national economic effect is much greater, but it is more difficult to calculate it. Incidentally, in spite of all the difficulties I have discussed, the startup of this flexible section under the conditions of production with many kinds of products and small series has made it possible to increase labor productivity threefold, to reduce the volume of incomplete production to one-fourth the previous amount, to reduce the cycle for processing to one-third of what it was, the reduce the production area to two-thirds its previous size and reduce the demand for labor force to one-fourth the previous amount.

"This is with all those shortcomings!"

A simplistic approach and the temptation to "report" about flexible automated productions that have been put into operation concerned the participants of the conference a great deal. They can clearly see that without updating the entire system, from planning and projecting work to concrete technologies and preparation of personnel, without efficient intercoordination of all units of simplific and technical progress, attempts "to accelerate" it could end up in the creation of a "cart with numerical program control"—a very dangerous hybrid of blind work and active eyewashing.

We Shall Not Be Falsely Modest!

"'Well, we will lose time," said Jonathan. 'Fly up into the air with me, and we shall begin..."

We have the actual experience of the best associations. Our magazine has discussed them, including the experience of the Leningrad Elektrosila and Svetlana, the Kiev Institute of Electric Welding imeni Ye. O. Paton, the

Ivanovo Machine Tool-Building Association and many others. Participants in the conference in Tallinn also repeatedly returned to their own experience, searching in it for certain answers that had already been found.

"Our branch, microbiology, is only 20 years old," noted Candidate of Economic Sciences B. V. Prilepskiy. "In order to increase the effectiveness of agriculture it is critically necessary to have preparations that increase the productivity of livestock and poultry: nutritive yeasts, essential amino acids, vitamins, ferments, antibiotics, biological means of protecting plants from pests and diseases, and bacterial fertilizers. We have depended strongly on foreign firms, and it was necessary to put a stop to that. We turned to the Academy of Sciences -- the Institute of Cytology and Genetics of the Siberian Branch of the USSR Academy of Sciences began to create subdivisions at its enterprise. One must say directly that we had our share of sorrows. But we were able to create our own equipment and assimilate what seemed to be unusual processes for the plant. Thus today it has become a reality to use genetic and engineering methods to construct microcells that have useful new properties--say, the ability for supersynthesis of biologically active By artificially combining genes the laboratory creates substances. microorganisms with given properties for industrial utilization. In the future there will be extensive application of microcomputers and microprocessors in biotechnology. Research and industrial functions are being combined. A considerable proportion of technical and program support and methods of optimizing microbiological processes created for our concrete production can be applied in other branches."

A note to the Presidium of the Conference: "We already know that exceptional attention is given to genetic engineering. We should like to hear about the experience of less prestigious branches—say, the food industry or light industry...."

Chairman: "The floor is turned over to Argo Sillaots, director of the Mistra Scientific Production Association, Estonia."

"Somewhat unexpectedly we earned the honor of becoming the first scientific production association in the system of light industry in the USSR," said Sillaots. "And up until 1978 this was a modest design bureau with a general profile: its associates engaged in mechanization of basic and auxiliary operations in the republic's light industry. One of the areas for the design bureau was the development of equipment and technology for producing nonfabric materials by the needle-piercing method. This direction seemed promising to us and we concentrated our efforts on it--and in the middle of the 1960's we created and tested the first domestic needle-piercing machine. followed by other sets of equipment, and over several years we created a completely modern domestic fleet of technological equipment for producing nonfabric materials by this complex new method. But it turned out to be difficult to introduce flow lines based on principally new technology: the clients were not ready for them. Then we created two experimental bases and there we began to conduct interdepartmental testing of the new equipment and to familiarize the consumers with it. In 10 years a production that was completely new in the country had traversed the path from the drawing board and laboratory to series output of sets of equipment, the development of

technology and the assimilation of the initial assortment. We think that we have here dual integration of science and production: along the design line and along the technological line."

What ensured success? First, the parallel scientific research and experimental design work within the framework of a single organization, and second, the vital link with machine-building associations of the Ministry of Light Industry in Leningrad and Serpukhov, and third-maximum utilization in planning of standards for machine builders which greatly facilitated the procedures of coordination.

As is usually the case, the new technology immediately evoked interbranch interest. While in light industry they were interested primarily in the sheet wadding, the lining material for sewn items and decorative materials, the construction workers were attracted by the carpet coverings for floors and the textile foundations for linoleum; the road workers--the geotextiles that were laid under roads; the chemists--the possibility of processing substandard synthetic fibers; the store Vtorsyrye system-the possibility of making use of certain fibrous materials which classical technology would not accept; automotive construction workers--the inexpensive and durable fine finishing materials; and there are still the industrial felt strips for various branches, and so forth. The interbranch nature of the demands for nonfabric materials forced the planning agencies to allot funds for expanding the design bureau and experimental base; in one five-year plan the volume of their output increased fourfold. But with the increased volumes there were increased contradictions between the policy accepted for allotting funds, limits, bank loans, possibilities of incentives, on the one hand, and the legal status of the design bureau and its experimental base, on the other. The solution got out of hand, and it was finally made legal to create the Mistra Scientific Production Association. Our scientific production association is a design bureau of the first category in Tallinn and two experimental factories in the cities of Byandr and Vilyandi. Each year at the plants of the Ministry of Light Industry they manufacture approximately 6 million rubles' worth of equipment that is designed at our design bureau. A total of about 390 various sets of equipment are manufactured. The association has 66 inventions, and 96 medals from the Exhibition of the Achievements of the USSR National Economy. The growth rate is more than 7 percent per year and the profitability of the commercial output is about 33 percent.

"I am convinced," declared A. Sillaots, "that the scientific production association is the highest form of production organization is quite suitable for developing and realizing technologies on a world level. We are now preparing to start up the third experimental factory for floor coverings. In order to make it possible for our designers and technologists to gain a detailed knowledge of the highest world needle puncture equipment, the equipment for the factory was purchased in Japan. We do not intend to copy it, but we must study it in order not to stew in our own juices. This third factory will be our main testing ground for the experiments."

"Not to stew in our own juices!" This idea came up in the conference again and again.

"The world level must be used in the plans and it is necessary on a systematic basis to support these plans with all sorts of resources. This is where one should begin," emphasized the general director of one of the associations represented at the conference, V. N. Tkachenko.

Question: "And is the world level planned for you?"

Speaker: "Undoubtedly. Here is an example: an item with the conventional name APST-M. For many items we are assigned directive technical-operational indicators so that whether we want to or not...we gather together a comprehensive brigade consisting of experienced specialists from the enterprises and we give them a common recommendation: when developing use a new element base, new materials, new design solutions. And to have complete freedom of creativity. After 12 months a principally new item has been created. Its older analogue has been able to operate for 10,000 hours without breaking down and the new one--40,000. The weight of the old one is 17 kilograms, and the new one--4.5. The number of parts in the old one is 2,346, and the new one--447. The energy consumption has been reduced to two-fifths the previous amount. This is our ordinary planning work.

"Having set the goal of reaching the world level of newly created products and providing for an annual increase in labor productivity of 10-11 percent without increasing the number of personnel, we developed equipment-target programs for the 11th Five-Year Plan. They included technical reequipment of production, unification of system solutions for the larger functional assemblies, revision of the element base and so forth. The entire program was oriented only toward new developments, the utilization of micro-assemblies, hybrid thick-sell technologies, large and superlarge integrated circuits, elements of fiberoptic equipment, microprocessors, minicomputers, and so forth. The base bearing structures were also unified. Up to 30 percent of the overall volume of labor expenditures are in our control operations, regulation, diagnosis and testing. When conducting a special information search in this area we reach the international standard of KMAK. Here it helped to cooperate with the Institute of Automation and Electrometry in Novosibirsk. The KAMAK Automated Control and Diagnosis System recreated on the basis of KAMAK--the ASKID-85--has a number of advantages over domestic and foreign (Columbia-200, England) analogues. The ASKID-85 system was awarded a diploma at an international exhibit. We are now developing equipment target programs up to the year 2000.

Question: "Are you satisfied with the existing system of management?"

Speaker: "Why be dissatisfied? It is necessary to achieve high results and within the existing frameworks."

Question: "With great freedom to maneuver, would you be able to trade with capitalist countries today?"

Speaker: "Of course. During the recess we exchanged opinions regarding this with the director of the association from Novgorod. He trades with them. We could too."

Progress of Technical Solutions-Through Progress of Human Welations

"You should train and see what is the truly beautiful seagull in each of these birds and help them to see this same seagull in themselves. This is what I call love...."

"Intelligent speeches, but we are all technical personnel!" one of the participants in the conference said with annoyance during the break. GAP's, ASU, ChPU, NChP...but why do I need ASU, if the plant is old and it is difficult and uncomfortable for the workers?"

"Make it comfortable," one of the others started to laugh.

"It cannot be too comfortable either," noted a third. "They will goof off."

And a fourth was silent. It was as though it was useful for her to listen with complete attention. The fourth was Valentina Sergeyevna Solovyeva.

When her turn came she said: "Everything begins with the goal. But freedom to set the goal is only apparent. One can declare that our most immediate goal is the output of products that can compete. And here we begin to rearrange the structure, technology and so forth. I do not think that we can set the goal this way. That is projection. Our Tiraspol Sewing Association has orders from Poland, Cuba, the FRG and all republics of the USSR, and the orders from foreign consumers greatly exceed our capabilities. Each year we update the assortment by 60-70 percent and produce more than 200 new models. It would seem that this would be the goal! But we have always posed the question in quite a different way, and we still do today. Our principle is that the collective must mature, it must be carefully increased, and its capabilities must be developed. We understand the ability to compete to mean the established capability of a given collective and all its services to produce products that correspond to the best world models. To develop such a collective—this is the real content of management work and also its main goal!

Solovyeva speaks agitatedly and passionately—she can do nothing else. When there is an audience before her her soft Ukrainian speech acquires force and conviction. The feeling is that at her back is a collective of many thousands of people who believe the same thing, and it is as though all of them are supporting this nice middle-aged woman with the high hairdo and the small but powerful gestures—their concerned director, a hero of labor, and a member of the government. Up to 10,000 people annually come to her association to gain experience!

Our magazine has already written about the experience of the Tiraspol Sewing Association, but quite inadequately. There is a need to discuss in greater detail this excellent collective where a strategy of continuous renewal has been in effect for many years.

At the scientific conference in Tallinn V. S. Solovyeva's speech was the most brilliant in terms of its social significance. For the majority of participants, both scientists and production workers, concentrated attention

on technical problems and not on the people who will be solving them. Remember the conversation in the corridor: "We are technical personnel!..."

Incidentally, an understanding that behind any problem is a purely human ability or inability, a desire or a lack of desire to solve it--every manager has this understanding.

In the very interesting speech by P. N. Belyanin which we already mentioned, one which deals with a wide range of problems, it is also emphasized: "In order to enter world markets we must first of all create collectives of designers and technologists by selecting real talents—people capable not of copying the best models, but of creating original and promising models of profile products."

The same speaker said: "What kind of a director do we need today? A very knowledgeable one, that is, a professional in the highest degree, a talented person and, perhaps, a fanatic...."

Where Are You Who Have Been Called and Invited?...

"'We are from your flock, Jonathan, we are your brothers.' They spoke calmly and confidently. 'We flew here to call you to fly higher....'"

It is not enough to give the appearance of being ready for innovations. More is needed. And even the successful experience of one's neighbors is not always acceptable for oneself. A lack of clarity is an abyss. It would be good to consult with an intelligent person—with a person who will help to figure things out because he has been called and invited. Is there such a person?

The last meeting of the conference was devoted to this subject. Its participants spoke that day about management consulting.

"The innovation potential is very low at many enterprises and it is premature to demand serious changes from them. This potential must be correctly evaluated and skillfully developed. This can be done best by professional consultants," said A. Ye. Luzin from MGU. "There are objective forces that will tear away any innovation. And it is necessary to know them and to master devices for suppressing their force. Unfortunately, there is no one optimal condition of an organizational system for successful realization of all phases of the innovation process. In its first stages--borrowing and generating ideas--it is necessary to have a high degree of mobility and freedom of the organizational mechanism. It is useful to enlist on a temporary basis the bearers of ideas from other organizations and to create a climate for search and free discussion of any projects. But then comes the stage of selection of innovative ideas--and here it is necessary to have well formalized procedures and the participation of the highest levels of management. In the stage of implantation of the innovation--making it a part of the existing organizational mechanism -- the risk increases sharply, interruptions are possible, and this means that it is necessary to have a confident and firm style of management and to make all procedures more rigid. Finally, the stage of permanent establishment of the innovation forces the management to deprive

personnel of the possibility o returning to old work methods. Here it is appropriate to have strict control and a rigid, almost authoritative style of management. And all these various approaches must be utilized by one and the same management within the framework of one collective and under stable conditions. One should not hope that raising the innovation level of the organization or, more precisely, those zones for which the innovation is being prepared, can be entrusted to one of the existing functional subdivisions. Not a single one of them is prepared for this, and their interests are limited. It is more useful to create a temporary comprehensive group under the top manager and to assign it the corresponding authority. Participation of consultants in this matter can vary within a wide range, but it is mandatory."

"In the concrete model for cooperation with consultants it is always unique," said Professor M. Ya. Khabakuk (IPK under the ESSR SM), one of the pioneers in management consulting in our country. "The complete consultation cycle," he continues, "usually contains these stages: diagnosis, selection of a solution, and the introduction as such." In the Estonian SSR management consulting has been practiced for more than 20 years. M. Ya. Khabakuk discussed in detail the experience in consulting at the Slovo Plastic Items Factory: how a systematic approach is taken there to developing the factory and how its future is predicted. The consultations lasted more than 3 years and helped the factory to strengthen its position as a leader in the production of a whole number of items that are in mass demand: support helmets, sports footwear and other items.

Returning repeatedly to the subject of industrial consulting, our magazine has always emphasized that the role of the consultant is similar to the effect of a catalyst: they activate the engineering and labor initiative of their clients and thus find the necessary solutions. This activization is especially necessary in the area of scientific and technical progress. Management consulting should obviously become a respected and developed branch.

At the last meeting, before adopting a resolution, the participants were asked: "What was not quite right? What was omitted? What conclusions should the organizers draw?" It turned out that there were not very many remarks: to inform the higher agencies of the resolution, to invite USSR Gosplan workers to the next conference, to represent branches which are almost not involved now, to ask EKO to discuss the conference. And again, as repeatedly happened in the breaks, one could hear the remark accompanied by annoyance:

"Not enough attention was devoted to personnel. Any technical equipment in the hands of a wild man is a piece of scrap metal. We turn billions into iron but it is necessary to spend more on people, on their technical and general culture, on the search for talent and freedom of creativity. All this too must be studied and discussed at the conferences...."

And nobody objected.

The general points concerning intensification and acceleration of scientific and technical progress expressed in the decisions of the 27th Party Congress

must be concretized, thought about, possible difficulties must be envisioned, and they must be turned into a program of action. In brief, it is necessary to search and search and search.

This is what the participants in the conference were doing. They were searching. Hence an image which has haunted the author--the image of a seagull looking for ways to improve his flight.

"Nothing should dampen your search--no customs, obstacles or taboos."

"Even if this is the law of the flock?" a voice rang out from the crowd of seagulls."

"There exists only one law--the one that helps to search for the truth and to be free," said Jonathan. "There is no other."

"...The young seagulls looked at their teacher sarcastically. 'Well, well, my friend,' they thought, 'that will hardly help us do a loop the loop.'"

Fletcher sighed.

"'Yes...well, anyway,'" he said, and left them with a critical glance. "'Iet us begin with the simplest—horizontal flight.'

"And although Fletcher tried to look at his students with the appropriate severity he suddenly saw all of them as they really were: awkward, incapable of figuring out what was going on even in their native flock, but with all their hearts striving for good and for happiness. He saw them that way for a moment, and he not only liked them—he loved every one. 'There is no limit, is this not you told me, Jonathan Livingston?' he thought with a smile. And he soared into a flight for knowledge."

#### **FOOTNOTES**

- 1. The very organization of the conference was impressive: participants from all parts of the country received the papers and topics beforehand: opponents were assigned to the people giving the major papers; the boundaries for discussion were outlined: products and technology of a world class; a "brainstorm" on management subjects; participants brought a number of documentary films and samples of their products; there were no tribunes: the whole conference was a round-table discussion; during the course of the meetings there were questionnaires and evaluations of the best reports and speeches; there was strict regulation. One felt the strong hand of the three organizers of the conference—the Estonian Academy of Sciences, the Siberian Branch of the USSR Academy of Sciences and the Academy of the National Economy, the Union of Tallinn, Moscow and Novosibirsk.
- 2. Lenin, V. I., "Poln. Sobr. Soch." [Complete Collected Works], Vol 34, p 313.
- 3. Martynov, A. K., Livshits, V. I., "Avtomatizatsiya meloseriyanogo \* mekhanoobrabatyvayushchego proizvodstva na baze stankov s ChPU" [Automation of

Small-Series Machine Processing Production on the Basis of Machine Tools With Numerical Program Control], Izd. tomskogo universiteta, 1984.

- 4. VESTNIK VYSSHEY SHKOLY, No 4, 1980.
- 5. See EKO, No 3, 1985.

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#### EFFICIENCY OF MERIT AWARDS EXAMINED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 8, Aug 86 pp 32-37

[Article by V. G. Grebennik, deputy director for economics of the Irkutsk Radio Plant imeni 50-Letiye SSSR: "A Spoon Is Dear By Dinnertime: Francen Merit and Remuneration"]

[Text] When speaking about bonuses one usually considers the effectiveness of one amount of bonus or another and their distribution. There is one more important aspect which I consider it necessary to discuss: the period of time between the fact of "earning" and the fact of "receiving the remuneration."

Let's take the provisions concerning bonuses for the development of new models of machines and equipment. They envision the payment of bonuses for the observance of deadlines established for the stages of development. And they last for months, quarters and sometimes years. In the intervals, the higher organization checks on the condition of the development only in terms of the amount of money that has been assimilated. And at the end, all that is checked is the observance of the time period for completing the development and the results of state testing, which demonstrate only that the model meets the given characteristics. In other words, the tests show whether or not the machine is able to do what is included in the technical assignment for planning. But at what price has this been achieved? What were the expenditures on development, how economical are the functions of the machine (energy, intensiveness, material-intensiveness per unit of usefulness), what is the level of technology the design—does it provide for the minimum labor-intensiveness in subsequent series manufacture?

The developer is not very interested in reducing the time periods for the design or searching for a more economic variance of the design. He has suggested this variant and the payment for his labor will not change. Just as it will not change if the selected design is less economical than those that are already known and assimilated in production.

This situation arises, in our opinion, because of the clarification of the USSR State Committee for Inventions and Discoveries concerning certain questions of recognition solutions as efficiency proposals. The proposals of engineering and technical personnel pertaining to plans which are directed

toward selection of the most economical variants as compared to those that are already known (except for inventions) can be recognized as efficiency proposals (that is, paid for depending on the economic effect that is obtained—V. G.) only after the approval of the plan and its acceptance for operation in a series (head) model or technological process. The interest here appears most frequently when the payment for the efficiency expert depends on the economy and progressiveness of all of the solutions, even partial ones. With this kind of dependency a real basis would be created for applying functional cost analysis in the stage of the development of the plan or technological process and the selection of the most efficient variant.

The existing policy makes it possible for developers to reject efficient proposals only after the models of the machines or technological processes have been turned over for operation: the greater the difference between the production cost of any particular element of the design accepted in the model and suggested for replacement, the grater the sum during of the remuneration. If moral considerations are set aside, the developer is clear interested in providing for the future a kind of reserve for reducing production cost and a guaranteed base for remuneration in the stage of series production. Moreover, in many cases the plants with series production have their own planning subdivisions. As a result, there is an increased need for instruments, equipment and materials, and sometimes costly purchased items, and the technological labor-intensiveness and duration of the production cycle increase. Of course, during the process of production obvious mistakes in the design and technology, as a rule, are eliminated, but most frequently it is only individual parameters of machines and equipment that are improved.

The provisions concerning discoveries, inventions and efficiency proposals introduced in 1974 are directed toward the development of the workers' initiative. They also envision holding officials responsible for red tape, bureaucratism during the consideration and utilization of inventions and efficiency proposals, and deliberate violation of the rights of the inventor or the efficiency expert to receive a remuneration. In keeping with the established policy for documenting efficiency proposals and paying remunerations for them, the enterprise, organization, institution, ministry and department which has accepted the application for an efficiency proposal to be considered, must register it and within 5 days give or sent the author a receipt certifying the fact and the date of the arrival of the application.

The application for an efficiency proposal should be considered and a decision should be made on it at the enterprises within 15 days, and in the ministry—within 1.5 months from the day it arrives. After this time the author is informed that the proposal has been accepted as an efficiency proposal and recommended for utilization or that an experimental testing is being conducted, or that it has been rejected. In the case of experimental testing, the author should be told about the decision within 15 days after it has been completed. The question arises: why can one not give a receipt (if it is necessary) at the time the application is received? For, as a rule, the application is submitted to the person in the shop authorized to handle efficiency and invention work or to a competent subdivision of the enterprise. One cannot but note that neither the time period for conducting experimental testing nor the time period for introducing the proposal are stipulated.

Thus, in our opinion, one prolongs the time periods for introduction and the time periods for awarding remuneration become irregular.

Material remuneration is paid to the author within a month of the day the efficiency proposal is first utilized. But this day is not determined by regulations and the efficiency expert does not know precisely when he will be able to receive his remuneration. Even with rapid introduction the time period before the payment of the remuneration reaches 1.5-2 months! And then there is also experimental testing....

Usually the efficiency expert receives his remuneration a half-year to a year after he submits the application. And if during that period he has had several suggestions, then, as became clear from the conversation with the efficiency experts, it is not always clear which one he is receiving the remuneration for. The matter is complicated also by the fact that the system of incentives for especially effective proposals envisions the payment of remuneration in parts. A certain part of the remuneration is paid 2 months after the end of the first year or the end of the utilization of the proposal.

The spoon is dear by dinnertime. Breaking down and prolongation of the time periods for payment reduces the effectiveness of the incentive system even more.

Something similar can be said about the material interest in selecting the optimal variant for the expenditure of raw materials, processed materials and fuel and energy resources in production and their wastes. In keeping with the decree of the CPSU Central Committee and the USSR Council of Ministers (1981), "On Stepping Up Work for Economizing and Efficiently Utilizing Raw Material, Fuel-Energy and Other Material Resources," and the decree of the USSR Council of Ministers (1982), "On the Amounts of Savings of Material Resources for Payment of Bonuses," there has been a considerable expansion of the list of materials for savings on which workers are given bonuses, and the normatives of deductions have increased appreciably.

Are the new possibilities being utilized in the practice of awarding bonuses? In my opinion, not always. Let us take the policy for calculating bonuses that exist at the enterprises. Basically, it is as follows: one determines the degree of fulfillment of the indicators for economizing on various kinds of materials (savings in physical terms are determined by the shop's planning and dispatch bureau). In conjunction with the foreman, if one is speaking about a section, the bureau submits information about savings to the shop's economist who, from the initial report, verifies the fact of the savings and calculates the sum of the bonus fund. When it is submitted by the foreman, the shop chief approves the list of people who are to be awarded bonuses. This is verified by the shop economist, who checks to make sure that the list does not include any violators of labor discipline and that the sum of calculated bonuses for each potential recipient does not exceed the maximum amount envisioned by the provisions and that proportionality has been observed in the distribution of the overall sum of the bonuses among the various categories of workers (among engineering and technical personnel and laborers). The list of bonus recipients approved by the shop chief along with the necessary calculation and reference materials is submitted to the division

for labor and wages where it is also strictly checked. After this they prepare a draft of an order from the plant director for the payment of bonuses, which should be coordinated with the trade union organization and the managers of the corresponding services.

It is not by accident that we have considered in detail the policy for calculating bonuses. As we can see, a good deal of time is spent on it and the fact of the awarding of bonuses occurs considerably later than the time when the savings are achieved. The effect of this way of awarding bonuses is clearly not complete. We pay immediately for savings of live labor with piece-rate work. Apparently we should do the same thing when it comes to savings on resources in which past labor is embodied. Additional payment for savings on material resources should, in our opinion, be made along with the calculation of the payment for the manufacture of the product. The same thing can be said about overexpenditure and making deductions for this.

The existing system for calculating and defending normatives for the expenditure of raw materials and purchased items, in our opinions, provides for sufficient substantiation. There are annual assignments for revising (reducing) expenditure norms. Therefore in order to calculate the payment for the savings or to determine the overexpenditure all one need do is introduce the corresponding accounting. In a document from which the wages are calculated it would be expedient, in addition to the rate for manufacture, to introduce a rate for savings (overexpenditure) of material, and the payment should be calculated according to two rates so the worker who has received a calculation sheet at the end of the month can see clearly how much was calculated for the manufacture of the products and how much was for economical utilization of materials.

One more aspect of savings arises in this connection. When parts are manufactured so-called wastes are formed. Let me point out that this word does not reflect precisely the essence of the matter. Wastes apparently include also things that could be used in the future. But during the process of mechanical processing of metal we obtain a part and shavings from the same metal. From the shavings it is possible to manufacture the same parts for which additional operations are needed (assembly, resmelting, rolling and so forth). Today's technology for gathering shavings and other unutilized scraps is as follows: they are placed in collection containers and there is no great concern about whether other objects are placed there as well or whether various grades of metal are all mixed in together.

Introducing rates (as part of the price list cost) for the collection, receipt and transportation of waste to the place for salvaging them will help to create interest on the part of the workers in the entire technological chain from the appearance of "wastes" to their release to the procurement points. "Wastes" are gathered in special containers and submitted to the control of the division of technical control along with the release of the prepared parts. The document under which the prepared products are accepted indicates the quantity of "wastes" for which payment will be calculated. The worker who delivers the products to the warehouse should also deliver the "wastes" to the collection point with a note in the accompanying document about their quantity and quality.

The additional work for accounting for the savings (overexpenditure of materials and calculating the payment can be an obstacle to introducing such a system. But it costs many times as much not to consider, not to calculate and so forth. And the capabilities of computers are great enough. Moreover, the brigade form of payment makes it possible to overcome these difficulties as a result of a certain reduction of calculations and the application of the check system.

By issuing checks to the brigade for the corresponding calculated amount and giving it the right to obtain a certain proportion of their value in the form of additional wages, we create a good incentive for more efficient utilization of materials and equipment and strict worker control over the collection and prompt release of "wastes."

It is generally thought that time is money. A true observation. The more time that separates the payment of the remuneration from the fact of the achievement or the merit of the worker, the greater it must be. Otherwise its effectiveness will decline. In order for people to feel that wages have been earned, they must be paid on time.

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#### IMPORTANCE OF PROMPT MANUFACTURING INFORMATION STRESSED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 8, Aug 86 pp 38-44

[Article by R. B. Gitelmakher, candidate of pedagogical sciences (Ivanovo): "Secrets and Treasures of the Instrument Cabinet"]

[Text] Only a month was left until series output of the new item. The schedule for preparing production had been met, but the tension in the work of all services was increasing. A number of problems had not been solved, including the technology for the manufacture of the "shift fork" part.

It had caused so much trouble for the technologists, designers, and production workers! And there was still no solution: instead of a commercial product there was a mass of rejected items and endless searches for the proper technological level of the design. And now after the end of the working day the plant's head technologist, V. G. Burakov, having learned the figures concerning the sizes of the part manufactured according to the newly proposed technology was convinced: another rejection!

Just this morning in an operations meeting with the head engineer Burakov had received a dressing-down, and it was concerning this part—they said that they had still been able to make the experimental model! "Nothing surprising," Viktor Georgiyevich sighed. "It is no trick to make one fork. The measurements were submitted to the instrument shop jig boring machine. This does not smack of series technology.

Burakov once again analyzed the "bottlenecks" in the "fork"—the intercenter distances were maintained but the size was lost between the plates. And this was always the way it was—the cart getting ahead of the horse. One thing was clear—success in processing the "forks" was to be found in the milling. Gathering all the utilized variants together again, the head technologists came to the conclusion: it is necessary to ask for help from the production workers.

During the dinner break Burakov went to the mechanic's shop to the milling section and met with the "ace," Aleksey Rokotov, who had numerous suggestions to his credit. Having unrolled the blueprint he formulated the task. Aleksey casually asked a couple of questions and concluded: "But why when something

breaks down does everyone go to Rokotov? There are other outstanding milling machine operators. For example, Igor Silantyev."

Rokotov immediately called Igor and as the head of the technological service was explaining the task to Silantyev, the "ace" moved away.

A week passed and Burakov again appeared in the section and went up to Aleksey's machine tool. The latter, without even turning off the machine tool, cut him off coldly: "Nothing has come to mind."

Silantyev himself came up to Viktor Ceorgiyevich, took him over to his machine tool, and having placed a sheet of paper from a school notebook on the cabinet, began to explain his own solution.

What did Silantyev suggest? Introducing two adapters for processing the plates on the milling machine. One for obtaining an additional technological base (processing the external surfaces of the plate) and another for cutting the groove after it had been processed in the first.

Burakov had his doubts: it was costly and took a long time. Additionally, Silantyev had asked for help in manufacturing several parts for adapters on the lathe, but the head technologist, knowing that both the basic production and the instrument shop were overloaded, gave an uncertain answer....

But there was no other solution. Burakov recommended that Igor fill out an efficiency proposal and just a little later send it to the head engineer, A. P. Zhelezov.

After considering Silantyev's suggestion, the "chief" was dissatisfied:

"Today instead of one adapter we have two, and in a week there will be dozens."

Burakov started to defend the solution, but finally he brought in Zhelezov. He cut him off:

"Well think of something simpler!"

The regular production cycle took both managers away from the "fork" for a certain amount of time.

But Silantyev had solved the problem for himself. Either he did not hope for any help from the technologists and designers, or he was afraid to ask for it. In brief, Igor acquired the blank pieces, drew a sketch of the adapters, manufactured some of the parts himself, and others were made by friends who were lathe operators. There was a lot that did not work and the blank pieces were of greatly different sizes; additional adjustment templates were needed; the foreman, because of a shortage of time, could not help and sometimes even gave reprimands for this independent activity. Silantyev came in early and stayed after work. Once he went to Rokotov for help, but he smiled in a sinister way:

"There is something here I do not understand—after all you have dozens of efficiency proposals and two cabinets filled with adapters, about which the technologists have no idea.

"You do not do your own work. There are engineers for this work. Do you really not understand that you are stealing wages from yourself, from me and the other milling machine operators?"

Igor did not expect this and exploded:

"Quite right, but for old items from which you cannot remove the grease. But what are you doing this for? For a new part, with which the technologist cannot do anything. In a month, our superiors will be worried about the plan and they will pay us any money in order to produce a machine. They must think about what Raykin will say."

And Rokotov, smiling, pointed at his head with his index finger.

Igor, discouraged, unwillingly dragged himself off toward to his machine tool. Two people were struggling inside him—one wanted to help production, show his capabilities and reach a solution to the problem that had been started; another, afraid of getting the reputation of a go-getter who will "cut" rates for a new item and arouse anger among his colleagues—the workers.

That day Igor barely lasted through the shift, and even at home he could not get the conversation with Rokotov out of his mind. He got up in the middle of the night, had a cigarette, and finally, came to a conclusion: "No matter what, I shall finish this adapter!" And within a week he had finished it, and along with a suitable part he placed it in the cabinet.

The month ended and a new one began. The parts for the new machine were manufactured in all of the plant's shops. Burakov was again faced with the question of milling the "fork," and again Viktor Georgiyevich without any special hope of success went to Silantyev. Igor surprised him before he got through the door, and he wavered a bit, recalling Rokotov's "wisdom." The desire to do a good job and an interest in the affairs of his home and enterprise had won out: Silantyev pulled the adapter out of the cabinet. Burakov's face lit up, he measured the space—the sizes corresponded to the blueprint. The head technologist sincerely thanked Silantyev and promised to help him to fill out an efficiency proposal and obtain a bonus.

The engineers kept the first part of the promise concerning this work. As for the bonus for the proposal, Silantyev did not receive this immediately. All documents were submitted to the BRIZ—here there were many doubts, proposals and red tape, but again with Burakov's help the issue was resolved in favor of Silantyev. When the proposal was submitted to Zhelezov for a final decision, the head engineer took his old position: "It is complicated and costly!" and he refused to approve the introduction and the bonus. Burakov repeated stressed to the "chief" that this position would offend the worker, would not contribute to the activity of the production workers, and, moreover, would cause them to take a negative attitude toward creative work for increasing efficiency, but Zhelezov was firm in his decision.

And what did Silantyev do during this time? From Burakov and from the workers in the BRIZ Igor knew about all the events that were taking place concerning his proposal. He had nothing to rejoice about and his soul became filled with indignation. At first he responded to the injustice "in his own way": Using the adapters he had created he manufactured several batches of high-quality "forks." Not a single part was rejected.

The production of the new item was in its third month. Finally the instrument shop was able to manufacture Silantyev's adapter from the new blueprints of the technological division—more compact ones, which provided for higher precision, but all the principal solutions were copied from the milling machine operator. So it has already been introduced, but where is the author's recognition?

And Silantyev began to take a different tack. First he made an appointment to see the "chief." Zhelezov received him politely, but the result was the same: "It is complicated and costly!" Igor went to the plant committee, the plant VOIR Council—and they did not refuse to help the milling machine operator, but 2 months had passed and the issue had not been resolved. And it was not until after a half-year, with the help of the oblast VOIR council, which had exerted "pressure" on Zhelezov, that Silantyev's proposal was officially recognized and the author was given his fair reward.

We have described this story in such detail in order to bring up the discussion of the barriers which frequently stand in the way of the workers' creativity.

The most typical mistake of the manager in communicating with the collective consists in that the former devotes the lion's share of the attention to the "very good" workers, or else to violators and those who lag behind. And on the sidelines are those subordinates who are in no way distinguished by their behavior—not externally, not by their words, and not by their inclinations. But these are the majority, and each one is an individual. The individual requires that his behavior, his actions and his labor be evaluated, and above all by the manager. The lack of this systematic evaluation leads to a situation where the individual's life becomes boring, "sleepy," and uninteresting. This mistake, incidentally, is typical not only of managers, but also of writers. Concerning this the writer V. Rasputin correctly noted:

"Take articles on the subject of morality. At best they are about the fact that the collectives have helped to correct an individual. Why do we not pay just as much attention to those who have not committed any wrongs, who have been working unnoticed, but honorably? Uninteresting?"

The outstanding Soviet psychologist B. G. Ananyev wrote that we know nothing about the entire area of potential for development for the majority of workers who are not included in the groups of leading workers or, conversely, in the category of those who lag behind and regularly fail to fulfill the plan. Here the situation is quite analogous to the differentiation of students only according to their degree of success, when behind the contrasts of the excellent students and the unsuccessful ones there is the basic mass of the

so-called average students. Additionally, there is always the danger of transforming this differentiation into permanent reputations which enter firmly into daily life, acquire the force of habit and frequently continue to exist even the person has ceased to be an advanced worker or, conversely, when someone who has been lagging behind becomes a good worker.

Inertia in evaluation turns out to be a serious impediment to managerial efficiency, and the application of the corresponding incentives (material and moral) on the basis of on-the-spot evaluations can give rise to a situation of conflict because of the lack of correspondence between the individual's old reputation and his altered activity.

Thus the modest, externally undistinguished, difficult labor of the efficiency expert frequently remains in the shadows, and he himself does not receive the evaluation he deserves, which reduces the individual's satisfaction with creative labor.

We see the second problem in the fact that in our literature many authors make too crude a distinction between creative and noncreative labor, including the labor of the majority of labor professions in the latter kind and thus at a very young age forming in the awareness of future workers a false notion that it is not necessary to "think" in the work position, "that there are engineers for this." This idea runs consistently through the memoirs of the former general director of the Leningrad Machine Tool-Building Association, G. A. Kulagin: "It seems to be that dividing human occupations into creative and noncreative is a clear example of that 'crude' categorization of reality which surpasses permissible boundaries."

It is curious that the majority of authors who discuss creative and noncreative occupations, as a rule, do not take the trouble to define the very concept of creativity, but find it fairly easy to include in creative labor only mental labor, deliberately excluding physical labor. Even if elements of creativity are recognized in the activity of the modern industrial worker, it is only to the extent that this activity includes mental labor.

This problem is also carried too far in the opposite direction—people publicize the difficult labor of the worker as a manifestation of nothing but creativity and enjoyment. Regarding this the well-known mentor, S. S. Vitchenko wrote: "Any work has its share of monotony, and there is nothing that can be done about it, one must put up with it. Unfortunately, our educators and propagandists somehow remain completely silent about this obvious fact in their conversations with youth. They rely increasingly on the creative nature of labor, endlessly repeating that there is happiness in labor and they do not take into account that both creativity and happiness are words that are not simple, and it is necessary to grow up before reaching a correct understanding of them.... Labor can be both creativity and happiness, but not all at once, not on the first day. One becomes accustomed to monotony, one no longer notices it, but this is not all at once either, but only after one accumulates mastery."<sup>2</sup>

In addition to these two large problems, the development of efficiency work in production is held up by a number of smaller, but essential problems.

In our opinion, each manager should see in the creativity of the workers an effective lever for increasing labor productivity and should render real assistance to the authors in the development of technical documentation and the manufacture of innovations.

In the second place, when documenting bonuses for a proposal that has been introduced, it is important not to allow people who have had nothing to do with the innovation to "get on the bandwagon."

In the third place, one must recall that an insignificant bonus allotted according to the principle "a little bit for everyone" does not serve as a real incentive, and frequently offends the authors.

In the fourth place, a manager who is interested in the creativity of the workers should take into account the fact that a change in the output norms after the introduction of an efficiency proposal puts the author of the innovation in an extremely uncomfortable position. For the workers who are manufacturing these parts according to the new rates consider the author to be guilty of reducing their earnings.

In the fifth place, the introduction of efficiency proposals is accompanied by a multitude of paperwork, which workers avoid for various reasons (they do not like it, they are embarrassed and so forth). Therefore, in places where technical services do not help the workers very much one should not expect efficiency proposals either.

Take a look in the instrument cabinets of the machine tool workers in the machine shops! They are bursting with adapters and special instruments which have been designed, manufactured and are being used constantly by the lathe operators, milling machine operators, polishing machine operators and so forth. But these innovations fairly frequently do not figure either in the technologies or in the flow charts. All of them are immense reserves of creativity! The worker is always thinking and frequently does this work for himself, and for the technologist and for the designer. Consequently, the task of the manager is to assimilate more actively this still concealed but incalculable wealth.

## **FOOTNOTES**

- 1. Rasputin, V., "I Live and Believe," KOMSOMOLSKAYA PRAVDA, 8 August 1982.
- Vitchenko, S. S., "Vstrecha s yunostyu" [A Meeting With Youth], Moscow, 1981, pp 79-80.

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## COMMUNICATIONS THROUGH CHAIN OF COMMAND DISCUSSED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 8, Aug 86 pp 45-68

[Article by Tatyana Boldyreva and Valeriy Lavrov: "In Search of 'Water of Life'"]

[Text] The beginning of this discussion appeared in EKO No 12 for 1985 and No 1 for 1986 under the headings "Gulliver's Lilliputian Steps" and "Heavy Aluminum." There it was reported, in particular, that two new enterprises-the Krastyazhmash Association, 20 kilometers from Krasnoyarsk, and the Sayansk Aluminum Plant, hundreds of kilometers away--are living through an equally difficult time. Production capacities are being introduced too slowly, and they are being assimilated just as slowly. At these enterprises, whose image today shows what heavy machine building and the aluminum industry should be in the 21st century, there are many organizational, technological, managerial, technical, economic and social problems which are being resolved in the old Hundreds of millions of rubles have been invested, large amounts of material resources have been expended, and there has been a good deal of human effort. But both for the national economy as a whole and for the USSR Ministry of Heavy Machine Building and the USSR Ministry of Nonferrous Metallurgy the return from these enterprises is not great, although they have been under construction for two five-year plans.

The need to accelerate the return from the funds that have been invested has been discussed quite resolutely at the 27th CPSU Congress, particularly in the report from the chairman of the USSR Council of Ministers, Comrade N. I. Ryzhkov: "The central unit of the investment policy is a radical restructuring of capital construction and an increase in its effectiveness. In this branch many unsolved problems have been accumulating over many years. The deadlines for the construction of facilities have been grossly violated, they have become more costly, and incomplete construction and stockpiles of uninstalled equipment have grown excessively.... Problems of capital construction must be solved immediately, taking advantage of all measures—economic and organizational."

Along the "Green Light" With the Red Traffic Lights

The attitude toward new enterprises in these ministries at first glance, as they say, is on the highest level. In the USSR Ministry of Heavy Industry one can immediately hear that the minister has oriented all administrations and divisions toward immediate solution to all problems of Krastyazhmash. This association, as early as the beginning of 1985, was separated out from the VPO, everything "goes on a separate line" right after such enterprises as Uralmash, the Novokramatorsk Machine-Building Plant, and Zhdanovtyazhmash.

To be sure, one is somewhat vexed by the fact that one of the deputy ministers in charge of capital construction has been eliminated.

This was the deputy Vladimir Mikhaylovich Nalivayko, who is well known in Krasnoyarsk. I recall that he said to us succinctly: "I will not say anything about Krastyazhmash, let Aleksandrov discuss it now.... As we know from Krasnoyarsk sources, he was aware of everything that happens "on every square meter" of this large construction site for the USSR Ministry of Heavy They reduced it, and transferred an immense "piece"--all capital construction-to another deputy minister. And he already had plenty of work to do: also an entire "kingdom"--new technical equipment. How many deputy ministers are needed-this question apparently is resolved not only within the walls of the ministry. We have a narrower question: Did Krastyazhmash lose something in this? Undoubtedly it did. And not because V. A. Aleksandrov did not delve into the affairs of this enterprise or has less influence than V. M. But it is difficult to do the work of two, and Aleksandrov could not go to Krasnoyarsk as often as Nalivayko did because of his "duties" to other enterprises that have been in operating for a long time.

In the neighboring USSR Ministry of Nonferrous Metallurgy the attitude toward the Sayansk Aluminum Plant was different: the minister or any of his deputies rarely came here. Is this bad? But there is the Soyuzalyuminiy VPO, there is the deputy chief of the VPO, Ilya Moyseyevich Aranovskiy, and he has one office on Kalinin Prospekt and another in Sayanogorsk. In which does he spend the most time? It seemed to us—in the latter: "I go to Moscow on business trips...."

In the USSR Ministry of Heavy Machine Building the official had approximately the same management rank. But he was removed from all of these matters. And Krastyazhmash was left without a "chief."

But still in the client ministries there are always people who are personally responsible for the destiny of new enterprises and who devote a great deal of attention to them. It seemed to us that these officials of the ministry too frequently resolve purely operational problems.

This takes place because of two managerial methods: a) the representatives of the ministry "slip" into the same harness with the director in order to straighten out the "knots" of confused relations with the builders; b) they check on the fulfillment of the corresponding indicators of the ministry: they inspect the activity of the directors of the enterprise.

The former method is more typical of the USSR Ministry of Nonferrous Metallurgy, and the latter—the USSR Ministry of Heavy Machine Building. Which is better? It is difficult to say.

Inspection of the activity of an enterprise is the legitimate right of the ministry, but here it is inevitable that people be divided up into the inspected and the inspectors, and there are also inevitable contradictions within the ranks of the client. And when the client has no unity, the contractor immediately takes advantage of this, which we shall see in the USSR Ministry of Heavy Construction.

There is a proverb: "When in Rome do as the Romans do." It is not altogether appropriate here because both enterprises are "Rome" for the ministries. But it seems to us that this position is preferable: the director is at the plant every day and the ministry workers are not there every day, but it is more useful for them to stand next to the director rather than above him.

Such, approximately, is the situation when the representatives of the ministry work directly at the enterprise. What do they think when they return from there?

In the USSR Ministry of Heavy Machine Building the opinions are fairly contradictory when they speak about Krastyazhmash. One service thinks that there is in general no special need for Krastyazhmash products.

On another floor they think the opposite: all kinds of technical equipment is wearing out in the mines and the introduction of the plant is very important for the consumers. In one service they say that Krastyazhmash should produce only the largest machines, and in another they say that the consumers generally do not need large machines and it is better to work with small ones.

In the Ministry of Heavy Machine Building they know that in the mines people would rather work with the Izhorsk excavators with the 8-cubic-meter scoops ("To be sure, this is not our plant," they said in the ministry, "the Izhorsk plant is under the jurisdiction of the USSR Ministry of Power Machine Building."

But this "small" vehicle has its own dump trucks. And in the Ministry of Heavy Machine Building they think approximately as follows. With this same Izhorsk vehicle they have started to use a 15-cubic-meter excavator, but will the Ministry of the Automotive Industry be able to provide BelAZes for it? Hardly. Then why are we in the Ministry of Heavy Machine Building introducing capacities at Uralmash for 20 cubic meters excavators. Who needs them? Let us use the Ural capacities for making drilling installations, there are not enough of them in Tyumen, and we will give the 20-cubic-meter vehicles to Krastyazhmash.... And why do we need such powerful rotary complexes—for 5,000 cubic meters an hour, and sometimes even 12,000—ask the designers? At such a complex it is necessary to maintain 50 fitters who sit and wait until something breaks down. These complexes should also be turned over to Krastyazhmash.

Of course the contradiction lies in the source of development, but even this situation in the Ministry of Heavy Machine Building can be called a creative refinement of the profile of the new enterprise. But one cannot lose the feeling that the clarity desired primarily for Krastyazhmash--what it is supposed to manufacture at least in the next 5 years--is lacking. And it is not only a matter of clarity. How quickly will the plant be able to get back on its feet and produce a return?

On one floor of the ministry they recall how grandly things were done at the VAZ: They sent a "team" of 150 of the best managers in the branch and it established a strict policy there. On another floor they are putting together the same kind of "team" for Krastyazhmash, but consisting of 15 people gathered in Kramatorsk. The ministry is unanimous about one thing: the plant is the simplest kind with only one profile, and there are no special problems with it. In a year or two it will be a great enterprises....

When thinking about such considerations expressed by specialists of the ministry, one asks the question: on what basis is this unanimity formed? So far Krastyazhmash is indeed a "simple" little plant as compared to Uralmash and several other giants that are in operation. But is it so simple? If one takes a look at the planning documentation of its first section and TEO (technical and economic substantiation) for the second section, a "year or two" will turn into at least a five-year plan or two, and perhaps even three....

In the Ministry of Nonferrous Metallurgy they consider their plant to be the best of all the backward ones and the most difficult. They have learned from the bitter experience of building the Bradsk, Krasnoyarsk and Tajik plants, and they are trying not to repeat old mistakes here. In the planning-economics and other administrations they do not speak about a "green light" for the plant, but rather about a fairly bumpy road over which the new enterprise will have to pass in order to become profitable, exemplary in terms of technology, and ecologically pure.

In spite of a certain difference in the attitudes of the two client ministries toward the new enterprises, the structure of managing them is equally complex. The "green light" for Krastyazhmash, in listing almost all administrations of the ministry or the leading role of the Soyuzalyuminiy VPO, in which there are plenty of concerns even with the existing enterprises—in neither case is there any guarantee that the problems of the new enterprises will be pushed out of the way by the problems of the existing ones. In this sense the ministry that is the general contractor has a higher management "rating."

The unified contractor for the two new enterprises—the USSR Ministry of Heavy Construction—has a management structure that is also fairly complicated, beginning with the main planning and distribution administration and the main administrations which are directed toward branches or problems (economic, technical and others). But Deputy Minister P. P. Selskiy has a team of specialists who literally "sit" at these enterprises, the more so since they are being constructed by one main territorial administration.

And in the Ministry of Heavy Construction they have a fairly clear sense of the state of affairs not only in their own construction trusts and administrations, but also the situation in the client ministries. One can see examples at every step, both in Sayanogorsk and Krasnoyarsk.

Both new enterprises have fairly complex water supply systems, but in Sayanogorsk it has already been operating and in Krasnoyarsk they have been throwing everything they have into it, afraid of going into the 1986 winter with a temporary water supply. They have managed somehow. Other engineering structures are comparable in complexity, and the energy supply in Sayanogorsk is even more complicated. But their complex of the organization of the Ministry of Heavy Construction and subcontractors, controlled (in theory) by general contracting organizations of the Ministry of Heavy Construction have introduced and Krastyazhmash is trying out all kinds of temporary systems. This "simple" little plant according to the estimates is much more expensive than the aluminum plants. Yet in 1985 both construction sites kept up with their volumes of work, with repeated "freezing" of work in Sayanogorsk and with more difficult transportation problems.

# A Complex Is Also "Cut" Complexly

In the USSR Ministry of Heavy Machine Building, Deputy Minister V. A. Aleksandrov cold us:

"The main problem is who is controlling construction: the clients, the contractors or the territorial management agencies."

To these three basic managerial forces it is quite possible to add also financial agencies, for example, the Gosbanks or Stroybanks, planning organizations, suppliers of construction materials, equipment and so forth, and, finally, transportation organizations which are most frequently independent of the construction site.... Around all construction sites, and especially such large ones, there are large economic-control-managerial forces. They are countless. It is a mighty troop of specialists. But who is in charge of this troop? Here we agree with V. A. Aleksandrov, that this is a major problem. In order to understand how it is being resolved, let us hear what the USSR Deputy Minister of Heavy Construction P. P. Selskiy has to say.

He has no office in Krasnoyarsk Kray, but in Moscow he is also "on business trips." And we had the rare good fortune to catch him and to hear something surprising:

"Since the 12th Five-Year Plan everything has been clear to us. Everything will be all right, and we shall increase the volumes of work, double and triple it, increase the number of workers in our subdivisions, concentrate forces...."

The conversation with P. P. Selskiy was surprising in its spirit and its meaning, for in the client ministries during this same week there was no such clarity, not only for the five-year plan, but even for the rest of 1985. Neither with respect to the assimilation or allotment of capital investments, nor with respect to the introduction of production capacities and their

assimilation. And we asked the deputy chief of the Head Production and Distribution Administration of the USSR Ministry of Heavy Construction, V. A. Barabanov:

"Perhaps you should not try to be clever? Give your minister, Petr Petrovich Selskiy, who is handling these construction sites, the capital investments, planning and everything else. You could create a powerful combine which would release new enterprises "ready to go." So why are you torturing yourself so much in Krasnoyarsk and Sayanogorsk with this confusing chain: client—planner—subplanner—general contractor—subcontractor—enterprise of the construction industry—transportation?"

"There is something in that idea...it was suggested that it be constructed so that everything was in one set of hands. But, in my opinion, this will not happen. In construction today there is narrow specialization, even in general construction trusts. And this is good. After all, would we be able to assemble metal elements? For such things we have the Ministry of Heavy and Specialized Construction, and it has a base...."

As the person with whom we were speaking told us, the USSR Ministry of Heavy Construction has the real path to accelerating things-in new technology for construction, for example, using larger blocks and flow-line construction. Without questioning the progressiveness of this path which is also not simple, one can, however, clearly see that the construction difficulties, beginning with the unified general contractor, his resources and capabilities, are becoming more complicated in Krasnoyarsk and they are being simplified in Sayanogorsk. These construction projects are similar to others, and at the others they have not created production bases for construction. The client ministries have given the USSR Ministry of Heavy Construction 87 million for Krastyazhmash and 42 million for the aluminum plant for these purposes. course all facilities of the construction industry cannot be located next to the construction site, but when the distance increases to 20 kilometers and more, it is usually better to abandon it without starting it up. Many problems at both construction sites are of an almost "historical" nature, and many problems still lie ahead. But the contractor is resolving them in an extremely differentiated way: more rapidly for the aluminum plant and more slowly for Krastyazhmash.

The explanation for this style of work was obtained on one of the floors of the USSR Ministry of Heavy Construction.

"It is easier and better for us construction workers when the client is strict. This is precisely the kind of client we have in Sayanogorsk."

For these two enterprises they have centralized solutions, and not just one. Let us take the very first thing for Krastyazhmash and look at the directive figures of the volumes of construction and installation work (according to the general contractor), how much money the client (the Ministry of Heavy Machine Building) had and what was actually provided by the general contractor—the USSR Ministry of Heavy Construction. The columns of figures are distributed precisely in this sequence (millions of rubles).

1979	31.6	22.0	24.0
1980	115.6	79.5	62.2
1981	149.3	92.5	68.0
1982	155.9	98.1	69.6
1983	156.7	80.6	69.1
1984	60.0	75.0	60.0

If the figures had coincided in all three columns the first section of Krastyazhmash would have been like "duck soup": they would have worked without any special concerns and produced excellent machines for the Ministry of the Coal Industry, the Ministry of Ferrous Metallurgy, the Ministry of the Mineral Fertilizer Industry and other smaller consumers!

Even with an office adding machine one can quickly add up the figures from any For example, in the first (directive) it turns out that the USSR Ministry of Heavy Construction should have completed 669 million rubles' worth of construction and installation work. But in order to do this the USSR Ministry of Heavy Machine Building should have received the same sum in capital investments. We add up the second column and we received 220 million less, which the client failed to receive. He is oriented toward the capabilities of the contractor, so the contractor had the final say right from the very beginning. Moreover, according to construction norms, with the best variant the USSR Ministry of Heavy Construction could not have reached the directive figures until 1987-1988. It was necessary to double the rates of the usual construction processes. How? The new construction equipment (mainly imported), and it was promised, but who was to operate this equipment? It takes no less than a year, according to the supplier firm standards, to prepare a person to operate this technical equipment, even if he has previously worked as a crane operator, a bulldozer operator or a machine operator. New construction materials are needed, but where does one get them? And, in turn, only specially trained people can work with these materials. Finally, it is necessary to have principally new technology and construction discipline in order to meet the directive deadlines.

In a report from Krastyazhmash (No 12 for 1985) it told why these construction projects were being drawn out. After conversations in the USSR Ministry of Heavy Construction, one was left with the impression that it had been cleared from the very beginning. But it is a good thing when specialists understand that it can be no other way but assert like an incantation: "It will be, it will be!..." Both in the ministries and at the enterprises they know that the main thing is to accept the deadlines and then open up space for work to prove the unfeasibility and establish new deadlines. As a division chief of the USSR Ministry of Nonferrous Metallurgy, E. V. Kurdasova, said: "We have a very willing attitude toward any deadlines for performing work or implementing decisions. But the situation changes, and one must become accustomed to the fact that deadlines, like plans, become the law."

Yes, the situation does change. But in those departments where we were conducting conversations it was not quite clear in which direction, for the structure of management of construction does not change. In Sayanogorsk the client is strict and things go better, and in Krasnoyarsk the client is less strict and things go worse. But strictness alone is probably not enough.

Both in terms of the time periods and in terms of the quality of construction, the principal difference between the two construction projects is not very great. The strictness of the aluminum workers does not help very much in avoiding many problems either because the orientation toward the capabilities of the contractor and, consequently, subordination to his "dictatorship" is the reality both for the USSR Ministry of Heavy Machine Building and the USSR Ministry of Nonferrous Metallurgy.

And a clear confirmation of this is the situation with the construction of the fourth, one might say, plant (Krastyazhmash consists of two, and the Sayansk Aluminum Plant also).

This plant is called the TsOA (Shop for Roasted Anodes). We have already discussed what these are in issue No 1 for 1986. Let us repeat that this is an immense production consisting of three technological chains. These are the technological rear of the enterprise, without which, if it has just one basic shop producing aluminum, the plant will begin to falter as early as 1986. It is simpler for the builders to construct 11 more basic shops, the more so since they are practically the same, than it is for them to build the TsOA. Now the "wheels" can find many more of various kinds of excuses than they could just at the aluminum plant. What can one do here? Straighten out all three "threads" and many confused knots and centers, bring all the available forces into "fighting order" and throw themselves into the battle for prompt startup of the TsOA? No, here it is much like the crossing in the fairy tale: go straight ahead and you lose your head, turn left and you gradually lose all that is left.... And it is quite understandable that the specialists of the Ministry of Heavy Construction are taking the well-trodden road directly into the departments of nonferrous metallurgy, the construction industry and other offices of the USSR Gosplan.

All these conclusions can be expressed in four words: "It is necessary to cut the TsOA complex." And the Gosplan specialists are beginning to cut not only the TsOA, but also the future of the new enterprises. Under these "scissors" we see disappearing the repair shop, the department for producing hearth materials for brick lining, and the shop for repairing the vehicles that carry the roasted materials is also considered an unnecessary luxury. And yet these vehicles are new technical equipment and, as the greatest achievement of the Ministry of Nonferrous Metallurgy, with the support of the Ministry of Railways they were included in the plan, but the USSR Gosplan "cut" the shop....

At Krastyazhmash, the technological rear of the enterprise is the metallurgical production, without which the shops cannot operate, but would have to sit and weight until products arrived from other enterprises, where there is no surplus. Here the basic production has been producing products for a long time, but the physical plant for metallurgy is just now being constructed. The incomplete construction of new enterprises inevitably entails the same kind of construction for individual productions—as the contractor is capable, and the interests of the client are secondary.

Unfortunately, specialists in comprehensive "cutting" of industrial complexes are working productively not only within the walls of the USSR Gosplan. They are being assisted by specialists from construction branches that do not have production capacities for comprehensive construction of too large a number of enterprises within Krasnoyarsk Kray, and the planners and clients are also helping.... Are there not too many "midwives" helping to give birth to a new enterprise? And not a single one is seriously thinking about the health of the newborn, about its correct development! And here is what this leads to.

"We are giving birth," as the deputy chief of the Soyuzalyuminiy VPO, A. A. Aranovskiy, said, "to colossuses with feet of clay." Many of our aluminum giants have no rear support units: repair base, environmental protection facilities, social infrastructure—and they can begin to falter at any moment. And they are already faltering. The position of the Gosplan and all of the "midwives" is this: they can do without it today. But tomorrow will be too late: in Bradsk they "cut" the shop for the anode material and because of this for almost a year the electrolysis shop produced no aluminum. The enterprise should have been able to operate from the first day. What can we do and are we doing about this? We are going into battle. Perhaps this is why in Sayanogorsk they have borrowed facilities which do not yet exist at the Tajik Plant, which is similar to this one and has already been in operation for 10 years....

Yes, the "aluminum workers" are diligent and serious people. They have been tempered in Bradsk, Krasnoyarsk and Tursun-Zad. It is "hard" for both the USSR Gosplan and the USSR Ministry of Heavy Construction to work with them....

The Illusion of Control and Reality

And so the fate of the new enterprise depends on many "helpers" and above all the contractor, the key management figure in construction.

Now let us take a look at what happens when a new enterprise is just barely beginning to "breathe." Here is what the deputy chief of the Soyuzalyuminiy VPO, V. S. Kalchenko, has to say:

"The machine builders were unable to produce equipment for roasted anode production. They purchased it abroad. Chemists and machine tool builders and enterprises of many ministries were involved in the startup of the enterprise. The new electrolysis units were the main technological ones. The 'heart' of the electrolyzer is the anode. A good deal of the electric energy is lost High-quality petroleum raw material reduces this expenditure. But at enterprises of the Ministry of the Petrochemical Industry they are not able to And sulfur for us is poison, and its content in reduce the sulfur content. the coke is increasing from year to year. Coal tar pitch fails to meet the GOST by more than half, but we must use it anyway. All this increases the expenditures indicators and we do not even know exactly how to judge them. We cannot, for example, measure the force of current precisely. We have paid several million rubles to scientists, but there is no instrument for this. In the first quarter of 1986 they promised to produce the ASU TP, and without it it is as though the aluminum plant has no head. But they did not produce it. We have operated without a system such as the one assimilated by the organizations and enterprises of the USSR Ministry of Instrument Building. Or the crane-manipulator to service the electrolyzers—almost a robot, it operates efficiently and precisely, and the electrolyzer itself is made with large tolerances. In brief, there is too much that has not come together: related ministries are at sixes and sevens. But we are achieving everything according to the Sayanogorsk method.

Listening to V. S. Karchenko we have a better understanding of the quite different attitude in the USSR Ministry of Heavy Machine Building:

"But what kind of problems do they have there in Krastyazhmash? The volumes of construction there are the same as at Uralmash, where they are building nothing, but are engaging in reconstruction!"

On another floor it was still made clear that Uralmash is assimilating onethird the amount of capital investments each year that Krastyazhmash is.

"What can be said about Krastyazhmash? Of course, the two lines—planning and new technical equipment—do not converge," said the deputy chief of the ministry's technological administration, V. V. Chernykh. "They have created a super level and hundreds of people have been working on the plant's problems. All the leading institutes have been enlisted. A board of experts of the USSR's State Committee for Science and Technology has confirmed the high level of all technological solutions for this plant. But yet this 'level' will soon be 10 years old...."

"We are not waiting for manna from the machine-building heaven, we are locating our machine-building plant right here in Sayanogorsk. We need progressive kinds of equipment and the latest means of mechanization, and we shall make them ourselves," said the minister of nonferrous metallurgy during one of his trips to Sayanogorsk.

In the USSR Ministry of Nonferrous Metallurgy they do not have enough fingers to count all the people they are trying to bring to the Sayansk Aluminum Plant, beginning with the Academy of Sciences. "World tendencies, you know. In some places we are at that level, and in some cases we are below it. In order to make the plant the best in the subbranch it is necessary to bring in all the best." In the USSR Ministry of Heavy Machine Building, it seemed to us, that the tendency was not to attract, but to distract attention from Krastyazhmash. And it is also being cut by all kinds of "scissors": four average-sized plants under one roof, dozens of machine tools that can barely produce products, dozens more machine tools that can produce nothing after they have been used by people who have not gone through the proper training (foreign firms require a year of training before that person is allowed to work on a machine tool or take the wheel of an excavator that it has produced). It does no good to look here for a repair production that operates seriously on a long-term basis. They are also cut by the ministry "scissors": hundreds of people have designed supertechnology, but the work has been started with temporary, "makeshift" technology. At certain plants, for example at the GAZ, the makeshift technology is called more advanced: new technology is being assimilated in parallel with the old products. At Krastyazhmash there are not yet any products that are new to the branch.

When figuring out all of these interbranch and intrabranch inconsistencies if not deformities, one is automatically reminded of those of our readers who ask this question: "Why are ministries needed? Why do they produce more paperwork than work?" Let us discuss ministerial paperwork.

Let us read the Order From the Minister No ..., published at the beginning of 1985. There are many pages. Half of them are a reiteration to everyone of the decree of the CPSU Central Committee that is known and has been published in the newspapers, and of the other half, it seems to us that 95 percent really has nothing to do with the minister or even his deputies, or even, in certain points, the chiefs of the main administrations. We dropped in to see the head engineer and asked: "Points 'A' and 'B' are yours, aren't they?" He answers proudly that he created them. After the minister's order there is an order from the director, half of which is also rephrasing to everyone things that they already know and which also has points which when you look at them you think: "But why does the general director sign such trivia?"

One piece of paper fell from the top, and an avalanche of them accumulates at the bottom. But at the top they work as though they were being paid piecerate and by the page.

In the Ministry of Heavy Machine Building, the Ministry of Nonferrous Metallurgy and the Ministry of Heavy Construction, in spite of such a different attitude toward the given enterprises, they complain that people from the enterprises "come crawling to them with all kinds of trivia." The first idea regarding this was simple: if they did not engage in trivia people would not come to them with it! But this idea is incorrect. For example, at the aluminum plant they learn that there will be no laundry for special work clothing. For the USSR Ministry of Nonferrous Metallurgy, this laundry, from the standpoint of the scale of its activity, can be seen only with the telescope. But for the enterprise it is not at all a trivial issue: is it necessary to explain what people will do with their special work clothing? Time and energy are expended. It is a pity. Professional stubbornness comes into play. For what? In order to find within the bowels of the USSR Gosplan that one person who has never seen such laundry and does not know what specialized work clothing at an aluminum plant would be, but the stroke of whose ballpoint pen can turn out to be fateful: there is no laundry....

And this is not the kind of trivia that the newspapermen sometimes write about. No. Although there is the point of view that the enterprises are so "beaten down" by the ministries, so bound hand and foot, that all they can do is shout "Guard!". We walked through two enterprises and two ministries that control them. One could not dream about greater freedom than that granted to these directors. One is allowed to do anything he wants to with the technological units. Although in the ministry they think that the idea is unproductive, they allow: let him try. The other is told: "Take 350 young specialists and develop them, and they will be your assistants. Three hundred and fifty is not enough? We will give you 400!" But in Krasnoyarsk whatever problem you may present, any plant specialist will point his finger upward: "They sit up there in the ministry and nobody knows what they are thinking about, if they are thinking at all!"

The years and five-year plans pass. But on the line of "ministry" is as though there is nothing new. And at new enterprises where life is much more complicated, the management roads are much more congested and it is simply bad for these enterprises themselves to find anything new in management. The ministry in its current form is an intermediate level between the USSR Gosplan, the USSR Gossnab and other so-called interbranch agencies. And the fate of Krastyazhmash and the Sayansk Aluminum Plant, as we have already seen, is frequently not decided on the various floors of the building on Kalinin Prospekt. And their destiny could be different, for they are self-controlled organizations without the rights and funds necessary for this. In one case the ministry tries to establish broad control over the enterprise, and at best to introduce consultation and expert evaluation at a higher managerial level. Or at the lower ministerial level they completely fall into problems of the enterprise, helping to resolve those which the enterprise itself cannot resolve because of various factors, for example, the fact that the director cannot gain access to one level of administration or another.

Today they "adapt" not to the ministries or to the minister; today they "adapt" to life as it is. For some the conflicts with the enterprises are more severe, and for others less so. The only illusion that still remains at the enterprises is that without the ministries it would be very difficult to obtain capital investments, all kinds of funds and imported technical equipment. We shall call this the "consumerist" illusion. The enterprise has long been utilizing the ministry's services. Intermediary. And it does not wish to have anything else from the ministry. Everything else, as the directors say, "we do through clenched teeth"—plans, reports, orders.... "We did not order this kind of music, and we have our own musicians for all of these things...." In brief, in the national economy today there is no lot that is more pathetic than the lot of the ministries in terms of their actual, and not their purported role.

One could, of course, make this lot in life a little better and try to move on from operational trivia to the level of the branch's general staff for all problems, beginning with world tendencies in the development of one or another area of technical equipment and technology and ending with ideas about the creation, for example, of an NPO for aluminum plants of Eastern Siberia. But the "golden key" which people are looking for today in the ministries is not to be found within their walls. And if one limits oneself to Krastyazhmash in the Sayansk Aluminum Plant, that slow turtle, that is, the USSR Ministry of Heavy construction, this "key" will not be found. And it has a very simple name: His Majesty the Ruble.

#### Games Around the Ruble

There are millions and billions of rubles in ministry paper—this is the same thing as directive time periods for the construction of two new enterprises. In our national economy we have learned to work with the ruble as speculators and second—hand dealers work on the kolkhoz markets, the "hidden" private sector of services which is operating successfully and openly, for example, near furniture stores, through whose hands money passes without delay.

What can "work with the ruble" be at Krastyazhmash or the Sayansk Aluminum Plant? Or even at Uralmash or the Bradsk Aluminum Plant? If everyone lives in debt: the state allots "money" without reimbursement, to return it through profit in many branches, especially those we are discussing, is an extremely complicated thing. Many new enterprises, for example, the Tajik Aluminum Plant which is almost a relative of the Sayansk Aluminum Plant, have been in operating at a loss for 10 years already. In Sayanogorsk there is a profit... Optimists, say, the chief of the planning and economics administration of the Ministry of Nonferrous Metallurgy, V. N. Kostyuk, place the time when the plant will become profitable somewhere after 1990; pessimists expect this time to come in 50-60 years. The "golden," most probable mean, is likely to be the beginning of the 21st century. The introduction of capacities at SaAZ has made it through the resolutions of the 26th CPSU Congress into the tasks for the 12th Five-Year Plan. And if the client ministries are placing their hopes in the USSR Ministry of Heavy Construction, what will happen to the ruble there?

Twenty years ago, during the general economic reform, they also decided to restrain the construction workers economically, "with the ruble," so that they did not just go after "gross output" and so that the clients would receive the production capacities more rapidly. They tried to keep accounts with them for "completed stages of work" and then they changed over to completed facilities: "We shall pay for facilities that have been released for operation." Both the stages and the objects were reduced to such minuscule values that the "gross output," the volume of construction and installation work, again very quickly crowded out everything, including the objects of the Ministry of Heavy Construction which were being discussed. Now people talk about "startup complexes." Both in Sayanogorsk and in Krasnoyarsk we counted so many startup complexes that, in the first place, one wishes to write joyfully: Enterprises are constantly in the startup stage. Second, one does not wish to be late for the ribbon-cutting ceremonies even if it is only one part of some shop. But when one goes through the enterprises one does not have a sense of such condition, and it would be more appropriate to hang black ribbons at many of the startup complexes....

But we listen to the specialists.

- V. V. Titov, former specialist of the administration for planning and construction of the USSR Ministry of Heavy Machine Building: "Construction workers do not need startup complexes, they need volumes of construction and installation work. At Krastyazhmash I could not find even a single document attending to the construction readiness of one facility or another."
- L. A. Busyatskaya, chief of the Planning and Economics Administration of the USSR Ministry of Heavy Machine Building: "The contractor goes where the work is according to the gross output, he does not need comprehensive construction. For this reason the idea of technical reequipment/reconstruction of enterprises has not caught on and in practice it now means new construction."
- V. A. Aleksandrov, deputy minister (USSR Ministry of Heavy Machine Building): "Each year it is possible to assimilate not 60 million rubles but 1.5 times this much, and still no new capacities will appear at Krastyazhmash."

- I. M. Aranovskiy, deputy chief of the Soyuzalyuminiy VPO: "None of our enterprises are constructed comprehensively and they have all been put into operation with great difficulty."
- V. N. Kostyuk, chief of the Planning and Economics Administration of the USSR Ministry of Nonferrous Metallurgy: "The funds are usually dispersed and not concentrated on any startup objects."
- E. V. Kurdasova, department chief of the USSR Ministry of Nonferrous Metallurgy: "The contractor does not understand or does not wish to understand what a complex is for us. It is necessary to construct according to our technological chain, and they are more interested in placing reinforced concrete columns. It is difficult to coordinate startup complexes with them, the builders, for they have their own tasks, and even with the help of the Council of Ministers one is not always successful."

That's a find how-do-you-do, old lady! The startup complexes appear if there are special orders from the USSR Council of Ministers. But the managers of the client ministries, economists, planners and bookkeepers of the client enterprises probably know that in our economic practice there has been a very simple idea that everyone can understand: it is necessary to do the building on credit and then when the contractor submits the prepared object you pay him for all the estimated expenditures. If he exceeds them he puts his "neck in a noose" and if he has stayed within them or economized he receives a bonus or else all the profit is at his disposal: let the workers and their specialists divide up the money and let them purchase new machines and mechanisms. Who is keeping the client ministries from paying the accounts of the builders instead of playing this paper game (and they do have such an account: for a million rubles there are to be so many resources of all kinds, but no more nails, so 1 may use these millions for costly materials and expensive work...and who is keeping them from going to the USSR Ministry of Finance, the USSR Gosbank or the USSR Stroybank and at least for the construction of new enterprises taking advantage of the "ruble" which can go into the pockets of the contractor only if he satisfies the client?

The clients themselves should take the "ruble" in their hands. Each year passes and during the course of that year there are "great battles" for obtaining capital investments for the development of the branches and, consequently, their enterprises. Each ministry tries to "scare up" for himself as much money for capital investments as he can, but he cannot find contractors who "wish" to assimilate it rapidly. Capital investments mean the receipt of money that does not have to be returned, for the mechanism for returning it is so severed from life and so complicated that neither the client nor the contractor makes any principal distinction there. "That is, how?!"—the surprised workers on one of the floors asked us. They are in no way different: neither in terms of their main target goals nor in terms of their mode of operation, nor even in terms of their attitude.

For the sake of the notorious "millions of rubles of construction and installation work" highly skilled specialists in construction, as a rule, former managers of construction trusts make campaigns throughout their

construction projects, gathering "tribute" which is called in the plan for volume the "gross output" of work. For the sake of the plan for the assimilation of capital investments another group of specialists of the same rank—representatives of the client—make campaigns throughout the same construction projects. And their work is essentially the same: to gather the "planned rubles" from the numerous construction projects. And they do this brilliantly, not thinking about what it costs the national economy.

From our viewpoint, to plan the assimilation of capital investments for the USSR Ministry of Heavy Machine Building and other clients, without setting for them the more serious goal of returning these capital investments on time, reminds one of the zealous irrigation of a field on which nothing has been planted. From the economic standpoint to utilize "millions of rubles of construction and installation work" as a starter for the economic mechanism in construction is the same thing as pouring gas into the wooden box on the truck.

Among the many experiments in the national economy there is one which is fairly limited in terms of the number of participants called the experiment of "releasing fully ready." It has changed little in the construction organizations participating in the experiment, or for the clients either. But this is also one of the progressive ideas whose implementation will make it possible for the collectives of new enterprises to feel quite differently and to repay the invested rubles more rapidly.

But so far the real millions of rubles are being dug into the ground, raised up into the sky or scattered in the winds near Krasnoyarsk and Sayanagorsk. For their owners these are abstract-report rubles. More precisely they are "dead" as they are for the state. Judicial-legal authorities sometimes try to "breathe life" into these rubles but even they do not have the "water of life."

In response to all kinds of considerations, thoughts and plans about how to teach the managers to manage, how to make the ruble be living and real, on all the floors of the buildings on Kalinin Prospekt and the nearby streets and squares they immediately take out piles of orders, instructions, procedures and provisions (from which, incidentally, people are supposed to act precisely in these three ministries). On the floors of these buildings the maximum they can say is: "There are certain distortions with respect to the ruble." Nobody is allowed to gather all of these into a heap and burn them. And so they invest hundreds of millions of rubles without obtaining a return for dozens of years, and everyone is allowed to do this...."

"We are too rich if one is to judge from what we are doing at Krastyazhmash," said the chief of the Planning and Economics Administration of the USSR Ministry of Heavy Machine Building, L. A. Busyatskaya.

Let us say that this ministry can be compared with any rich monopoly in the world. But this firm would have been bankrupt long ago if it had been allowed to do what it has done at Krastyazhmash, Abakanbagonmash, Sibtyazhmash and other Krasnoyarsk enterprises of this ministry. Just those in Krasnoyarsk.

But the new enterprises, and the old ones too, too frequently "burn" economically, that is, for fulfillment of the planned assignments. And the participation of the ministries has long had the marked style of "going to a fire." Regardless of what business correspondence one may look at, there is always a mass of measures and actions. In this avalanche of papers issuing from the ministries, as was written in 1980, only 5 percent is useful information. We have not received any fresher scientific information regarding this, and therefore we can quite hypothetically say that this 5 percent has not decreased. And behind this very small figure lies concealed that which the ministry should be engaged in-the long-range development of their enterprises, and the remaining 95 percent is operational information which does not interest very many people and which changes very little, although a very large amount of management forces are spent on this. majority of measures and actions on the part of the ministries, from our standpoint, are "single day campaigns." And the destiny of the new enterprises all sink to the same bottom. What would happen tomorrow? There are many discussions, but no actions. And what happened yesterday? Leaf through the history of the construction of aluminum plants and heavy industry There is only one tendency—with each five-year plan they have been constructed more and more slowly, with greater and greater losses, for, among other factors, the level of the "equipment operators" has dropped.

Hardly any of the aces of past years in the ministry would approve the idea of constructing a mechanics-assembly production at Krastyazhmash first, and then a metallurgical production. The first question would preclude all the rest: "Does this mean that we would be shipping in blank pieces from Sverdlovsk or Kramatorsk? And we would be shipping them all the way to Krasnoyarsk?" This idea hopped through the current staff of the USSR Ministry of Heavy Machine Building with the speed of an express train, without any stops or questions. And the new machine assembly shops were included for interbranch cooperation. What is this? Even at the plants of the Ministry of Heavy Machine Building which have their own metallurgy there are still 40-50 "cooperators." The Krastyazhmash workers have to live cooperatively for a minimum of one more five-year plan. How many "cooperators" do they have? Three people. The result is not only a constant "moan" about metal in the shops, daily idle time of the brigades and low earnings for them along with all the other consequences that are unpleasant for the enterprise. The second result is the fact that almost every day, with small volumes of production at Krastyazhmash, workers of the ministry fuss about every batch of procured items (ton or even kilogram of cast metal). This does not happen without doing harm to the solutions to many long-range problems concerning future metallurgical production.

The second example. We read the minutes of a conference with the deputy minister. We see: "Determine more precisely the brand of cable and where one can get it." It indicates the name of the specialist who is responsible for carrying out this order from the deputy minister. The most insignificant knowledgeable specialist of the "older" generation could probably do this without any recorded instructions or even without the deputy minister. But with this kind of "fire alarm operation" style, of course, there is simply no time to think about how to "put life" into the ruble.

The Figures Grow and Then Some

But we have deliberately overemphasized the negative aspects of the events taking place along the line of "ministry-new enterprise." But we have discussed far from all of these aspects. Just the so-called "human factor" at Krastyazhmash and the Sayansk Aluminum Plant have many constituents, beginning with housing. Under the pressure of production problems, social and cultural-domestic needs of the enterprises are pushed into the background.

But, obviously, even production problems are not being resolved in the best It is necessary to have a fairly sharp change in the activity of the USSR Ministry of Heavy Machine Building, the USSR Ministry of Nonferrous Metallurgy, the Ministry of Heavy Construction and other ministries participating in events at these two enterprises. And they must not only change directions, but they must approach all the old problems and resolve them in a new way. In the political report of the CPSU Central Committee to the 27th Party Congress it said: "It is finally time to put an end to the practice of having the ministries and departments babysit enterprises. their activity the ministries should concentrate their attention on issues of a technical policy, intrabranch proportions, and the level of satisfaction of the needs of the national economy for high-quality products of their branches." In all of the ministries which we visited it is necessary to do a good deal in order to intensify production and existing enterprises, to reconstruct them, to fill them with new technology and technical equipment, to change the style of management, and even today to work so as to reach the more rapid rate that is fundamental to the new five-year plan.

It would not be a bad idea to concentrate the forces of the most qualified specialists of the ministries at the new enterprises since the "old ones" can solve their own problems using their own forces. But here, at Krastyazhmash and the Sayansk Aluminum Plant, with the new approach the staffs of the branches could apply all the best economic practice that is in their arsenal for industry and construction.

Without casting doubts on the qualifications of the specialists of the ministries who, at first glance, seem to engaging especially in the problems of Krastyazhmash and the Sayansk Aluminum Plant, it is not difficult to see that even the leading engineers, "sitting" at their enterprises, the first management "rung" in the ministry, do not limit themselves to problems of these enterprises alone. There are "one-time" instructions concerning other plants as well. At the same time these "one-time" instructions for new enterprises are given to specialists who know only from hearsay what is going on there. Hence, it seems to us, it would be advantageous for the client ministries if:

they had a unified group of various kinds of specialists (from those who know what is going on in the USSR Gosplan to permanent staff members looking for skilled "volunteers" for assimilating the new enterprises), a group working on the most rapid introduction of the capacities and their assimilation, and a group with its own program, possibly under the direct jurisdiction of the minister;

orientation toward the "assimilation of capital investments" would be replaced by orientation toward profit obtained from new enterprises;

if the new enterprise were directed toward traditional products of the branch, even at world standards, it should produce these products without looking to the old enterprises, but utilizing the scientific and technical stockpile of the country in the world, that is, it should produce products of a technical level that is unattainable for other enterprises.

We have become convinced that the contracting ministry controls the clients and is more concerned about maneuvering among many objects for the sake of fulfilling the plan for volume of construction and installation work, and for him the startup of new capacities is a secondary task. Since it is necessary to introduce an operable industrial complex and not "startup complexes" which gratify not so much the client as the general contracting organization, from what has been said it follows:

It is necessary to change the policy for financing contracting organizations. Nobody needs accounts with them that cause only omissions for the client, but they need a system of credit (advances) with a final settlement only after the release "ready for operation," after the first products have been obtained. This is probably also clear to the specialists of the USSR Ministry of Finance and the USSR Gosbank and Stroybank. What is keeping our financial experts from breathing life into "dead" rubles?

The planning of construction and the introduction and assimilation of new production capacities are also in need of changes.

One gets the impression that the departments of nonferrous metallurgy and heavy machine building of the USSR Gosplan are led not by planning specialists but by managers and specialists of the USSR Ministry of Heavy Machine Building, the USSR Ministry of Nonferrous Metallurgy and the USSR Ministry of Heavy Construction, who are able to lead these departments of the USSR Gosplan in one direction or another to the extent of their strength. And the saddest thing is to lead them back approximately 30 years, into the age of complete dominance of gross output indicators. They are now called something else but this is more of a camouflage than anything else and it does not change anything essentially.

And since we are speaking frankly we can understand that it is not easy for the managers and specialists of the USSR Gosplan, the USSR Ministry of Finance, the USSR Gosbank and many other "above-ministry" agencies. For in 1986 it will be necessary to divide up 185.9 billion rubles' worth of capital investments among thousands of construction projects. Reporting to the deputies of the USSR Supreme Soviets on the budget for 1986, the first deputy finance minister of the USSR, V. V. Dementsev said, in particular:

"Attention is drawn to the practice of disbursing capital investments which is continuing in some places.... For this reason a number of ministries have allowed the volumes of incomplete construction and supplies of uninstalled equipment to increase considerably over the normatives. At the same time the assignments for introducing production capacities are regularly

underfulfilled. This situation has arisen, for example, in the USSR Ministry of Nonferrous Metallurgy, Ministry of the Petroleum Industry, Ministry of Heavy Machine Building and Ministry of the Electrical Equipment Industry."

At this same session of the USSR Supreme Soviet the chairman of the USSR Gosplan, N. V. Talyzin, noted that "there is to be concentration of capital investments and the forces of construction organizations primarily on startup construction projects and facilities."

At that same time and in that same place it was very clearly stated that the quantity of newly started construction projects is limited. Limited essentially. Demands were placed on the USSR Stroybank and the USSR Gosbank to strengthen control over increasing the effectiveness of capital investments and adopt decisive measures for influencing clients and contractors who allow disbursement of funds.

But, unfortunately, if one takes a look at the same reports at sessions of the USSR Supreme Soviet for 1981-1984 one is convinced that these good resolutions have already been made repeatedly. The figures change. They increase. But the essence of the matter does not change and there is no change in the methods and principles of planning, financing and managing even such large construction projects as Krastyazhmash and the Sayansk Aluminum Plant.

And this applies even more to the concept of "disbursement of capital investments" since it pertains primarily to the client ministries and the contracting ministries which seem to be narrowing their activities fairly calmly and with "a concentration of forces of construction workers on startup projects and a reduction of the number of construction projects." This was during the past five-year plan, and it is also taking place during the first year of the new five-year plan.

A sum of 185.9 billion rubles from all sources of financing is such a figure that the millions of rubles allotted to Krastyazhmash and the Sayansk Aluminum Plant for 1986 could seem like "pocket money" for the state as a whole. And seeing how torturously and pointlessly these millions are spent, standing in front of the "maps of new construction sites" in the country, on which with one's eyes closed one can just point their finger blindly and end up on some construction project, we recall one proverb told to us by the construction workers.

"...The devil sent a gypsy after some water and could not wait until he came back. He followed in his footsteps and saw that the gypsy was digging around the well and wanted to get all of the water at once. The devil taught him that a bucket of water was enough for dinner and sent him after wood. Again he grew tired of waiting and went to have a look. He saw that the gypsy had found a large rope and was trying to put it around the entire forest. Again the devil taught the gypsy the right way. He sent him to the garden for potatoes...."

And we think that this kind of "devil" should be put in charge of capital construction and he should be given this 185.9 billion rubles. And we think that he long ago would have introduced the first sessions of these two

enterprises and everything else needed to operate them. Of course, nobody believes in devils any more. And although gypsies do visit both Krasnoyarsk and Sayanogorsk, this is rarely. But we have not encountered them at our construction sites.

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## ADVICE GIVEN ON HOW TO MANAGE A NEW ENTERPRISE

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 8, Aug 86 pp 65-67

[Article by A. G. Orlov, economist (Vitebsk): "How To Manage a New Enterprise?"]

[Text] I have been an EKO reader for about 7 years. I am writing you for the first time. My motivation was provided by the report entitled "Gulliver's Lilliputian Steps" (EKO, No 12, 1985). I have also worked in one of these "Gullivers" which has not grown up in 10 years-the Minusinsk Electrical Equipment Industrial Complex. It is also located in Krasnoyarsk Kray. At one time this complex has experienced everything that was described in the report about the Krastyazhmash. There they initially constructed a plant for nonstandard equipment, but this was limited to its first section. plant was being constructed they changed its profile: the ministry reoriented it for the output of specialized technological equipment, and the main consumers of these products were in the European part of the country. second plant--for high-voltage vacuum switches--had the same fate. Managers of all ranks were constantly being replaced at the new enterprises. The losses of the enterprises did not decrease, but increased. The mistakes made at one time grew subsequently and the new enterprises could not get out of the hole for many years. Because of family circumstances I left Minusinsk and went home to Vitebsk, and I began to work at an enterprise that was under construction. And here the picture is the same. Why does this happen?

It was correctly noted by the general director of Krastyazhmash, Yu. I. Yushkov, there is no more difficult problem than that of personnel. A new enterprise receives mainly specialists who need either an apartment or job advancement. Here they usually have higher positions than they had at the old enterprises. But before they take them they must be trained. By whom? A new enterprise is beginning from zero. At the same time it is necessary to construct and introduce production capacities and facilities for social, cultural and domestic purposes and to assimilate new technologies and products. As long as the specialists are spreading their wings and their activity costs the state millions in losses, things do not proceed. But it is simple to blame the managers of the new enterprise, but to find competent workers for it is much more difficult.

I envisioned this solution to the problem. One of the leaders of the ministry at the level of the deputy minister for chief of VPO or main administration, depending on the significance of the enterprise for the branch, gathers together a group of specialists who figure out the planning documentation in detail, and then the group goes to the construction site. It also organizes all the work for construction, starting up the production capacities and bringing them up to the planned level of return. At the same time, these specialists gather and prepare specialists of a lower rank to take their place. And, having trained them, they put in their hands all the "reins of administration" of the new enterprise. Then the construction and startup of new enterprises might not be so prolonged and tortuous.

Something similar should be done with the enterprises that are chronically lagging behind, and when new methods of management or new technical equipment and technology are being introduced. A group of the best specialists of the branch should act not in the role of consultants or inspectors, but in the role of temporary managers—"teachers." The organization of such groups is the more possible since this would mean a reduction of the management staff. People who have many years of management experience probably find it difficult to leave Moscow and adjust themselves to other work. But their knowledge could be used in the aforementioned way at the new enterprises.

At the same time I do not rule out the possibility of consultation assistance when introducing new management methods, technical equipment or technology. But, in my opinion, the approach here should be an interbranch one so that the target group would include scientific workers and production workers not only of their own ministry, but primarily those who have experience in this area. It is necessary to teach management workers to "count money"—to be real masters, to give them all—round information and to convince them that in the final analysis it is inexpedient to conceal reserves.

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### OLD PROBLEMS RESURFACE IN NEW MANAGEMENT

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 8, Aug 86 pp 69-74

[Article by A. M. Khlystov, chief of the planning and economics department of the Novokakhovskiy Electric Machine-Building Plant: "Old Questions Under New Management Conditions"]

[Text] One of the main provisions of the large-scale economic experiment is unconditional fulfillment of deliveries under contracts. This provision is also being observed under the new conditions of management.

Nontransit norms for dispatching products are still a stumbling block in the fulfillment of agreements. In spite of the decree of the USSR Gossnab concerning the prohibiting of the breaking up supplies into smaller-thantransit norms, the matter of consolidating supplies is advancing slowly. Of the immense number of our consumers in 1984 only 13 obtain carload norms. Thirty percent of the consumers were relieved of the need to consolidate their supplies at all. And here the striving of the plant under the conditions of the experiment to provide for fulfillment of contractual commitments within the established time periods has turned into an unfair punishment. In 1983, even before the economic experiment, we observed the technical norms for dispatching to the detriment of sales, taking into account the fulfillment of agreement, and we paid 4,400 rubles' worth of fines because of underloading of In 1984 we paid 177,700 rubles and fines for the same reason. providing for 100 percent fulfillment of sales taking deliveries into account, on nontransit underloading we lost an immense sum of profit that we had earned honestly. We did not even have enough of it so that, while we had above-plan accumulations, we could make additional deductions into the material incentive fund for 100 percent fulfillment of agreements. We think that if one is to increase the tariff for nontransit delivery and all the additional outlays, including fines, and apply it to the consumers, they would develop an interest in consolidating their loads and they would begin to take advantage of the services of the territorial sales bases.

As we know, in order to maintain the normal course of production we are supposed to have a normative insurance supply of commodity and material values. In order for the contractual commitments to be fulfilled rhythmically, from the first day of the first month of the year, the

enterprise must still have a certain planned normative supply of prepared products. Attempts to create such a supply through early manufacture are not understood by the Main Administration for Supply and Sales for the Electrical Equipment Industry under the USSR Gossnab. Those that have normatives of prepared products do not admit it, and residuals are unquestioningly used for resources and funds are allotted for them. Formerly all of this is correct, but only if the rolling stock is provided just as efficiently and timber materials, rolled ferrous and nonferrous metals and other things are delivered. Then all supplies would indeed be surplus.

It is impossible to have high effectiveness of production when there is chaotic supply. This is confirmed by the work in 1985, especially in the first quarter. During the second year of the economic experiment, the plant began with a provision of 97.1 percent of the necessary amount of rolled ferrous metals. Problems remained unsolved with respect to 30 positions of the plan for material and technical supply. Even in the middle of March the deliveries of cast iron for the first quarter were fulfilled by 36-50 percent (depending on the supplier). Not enough enamel wire, bearings, bulk steel and so forth were delivered. As a result, the plant fell from the pedestal of honor to positions that were worse than they held before the experiment. The plan for January-February for sales was a failure, deliveries for the 2 months amounted to 94.8 percent, and for the first quarter—99.3 percent. The planned quarterly rates of increase in labor productivity were not fulfilled and the maximum level of expenditures per ruble of commercial output was exceeded.

The severe conditions of last winter might be some justification for the failure to fulfill the plan. But one cannot write everything off to that. Strange as it may be, the difficulty with the resources during the first half of the year, especially the first quarter, arose because of the higher planning agencies. At the beginning of January it was necessary to submit orders for the production program for the following year to the territorial supply agencies. Naturally, at the plants there were no plans for the following year except for the five-year plan. But the physical indicators of the five-year plan become outdated so quickly that they are practically not used for current planning. It is necessary to increase the role and significance of all indicators of the five-year plans. The five-year plan should be difficult, but it should be reliably supported by resources, longterm normatives, capital investments and so forth. The control assignments of the five-year plan should be viable, so as to become a firm foundation for the current annual plans. Then, without waiting for figures from above, the local agencies could promptly develop realistic plans for all periods of the activity of the enterprises.

The activity of the metal consuming branches could possibly be evaluated taking into account the sales of supplies, at least for the most important materials. If the supplies allotted taking into account the assignments for reducing expenditure norms are realized by 100 percent, and the delivery of final products is provided for by 99.9 percent, then the activity of the enterprise should be rated as satisfactory. When the levels of sales of material supplies and deliveries of prepared products are equal, let us say 98 percent of the deliveries are higher than the level of sales of supplies (96

percent), the metal processing enterprise that has not fulfilled its contractual commitments should not have material sanctions in the form of deprivation of bonuses and reduction of economic incentive funds. The maximum incentives should be received by collectives that have sold the supplies for metal products and fulfilled their contractual commitments. The collective fund of savings of resources created as a result of this will be provided and the enterprise, it seems to me, will not be interested in disbursing resources for other than their intended purposes.

Under the new conditions of management, when indicators of effectiveness of production have come to the foreground and when an attempt is being made to satisfy the real need of the national economy, a special position and special meaning should be given to such economic concepts as the counterplan, socialist commitments, additional assignments and above-plan output. All these categories are oriented toward growth output at the present time. Not a single one of the indicators listed above is supported with resources, if only because they are formed on the threshold of the planned year, that is, when there is not a kilogram of metal to be had. In the middle of the year, as a rule, the orders for supplies are being completed. And it is prohibited to produce items that are not funded.

Abstract decisions "to provide through savings" will not hold up under criticism. An item takes materials of dozens of kinds and to save exactly enough of them as is needed to provide for the counterplan, socialist commitments or additional assignments is, to put it lightly, impossible. We must provide in a planned way for the output of products needed by the country. And above-plan, i.e., nonplanned products should not be used for plans, and they should be sold! The consumer might not even purchase them. As a rule, the consumer does not need above-plan products today. Above-normative residuals in the warehouses, which freeze material values and cause financial detriment, are needed neither by the supplier nor by the consumer.

Counterplans, commitments and other measures that increase the activity of the collective should be adopted only according to indicators of effectiveness—growth of labor productivity, reduction of expenditures, increased outputcapital ratio, introduction of new products and so forth.

Sometime before the experiment industry began to work according to the indicator of normative net output. At one time the NChP evoked a lively debate. Now the passions have died down, experience has been accumulated, and a certain opinion has been formed. We should like to return again to this unusual indicator. In spite of the fact that today many people are probably ending up on various sides of the problem, in our opinion, there is a certain value to this indicator. In the current stage it is closer than others to the mass of live labor, it reflects the level of newly created value, and it has direct contact with the country's national income. But under the conditions of the enterprise, the attitude toward it is restrained. Calculations have become more complicated and there is a large amount of additional work for economists, workers in operational accounting and bookkeeping, and pricesetting agencies, which can in no way be included in the annual reduction of precisely this kind of personnel as the mass representative of the disgraced category of administrative and management personnel.

The normative of net output, in my opinion, is limited to the sphere of its own influence. And it is capable of being unified only at the level of general plant accounts. When it reaches the production shop it loses its intended purpose-to realistically evaluate the measure of labor of the initial unit of the collective. The NChP includes the value of the total labor of the workers, engineering and technical personnel and employees plus the norm of profit, and under the conditions of a concrete production the normative should be able to be "broken down" into the shares of the basic shop, the auxiliary shop, the procurement shop, the service shop, and it should even go down to the brigade and work position. Thus to evaluate the live labor of each shop working under the conditions of intraplant cooperative ties is impossible with the NChP. It should not be applied to the infrastructure at all. In places attempts are made to adapt redistribution of wages since the fund is formed according to the NChP, either according to the normative for each ruble of NChP or according to the rate of increase of the NChP as under the conditions of the experiment. To do this they establish primitive shop normatives of net output which are calculated in proportion to the labor-intensiveness invested in the item by the given collective. enterprises do not plan the NChP for the shops at all.

But the wages can be distributed among the collectives according to the increase in live labor-intensiveness which, incidentally, is calculated at each enterprise. Here the savings on wages achieved by the introduction of organizational and technical measures for the current year should remain at the disposal of the labor collective. Then the savings will be actually earned and not formed at a technically advanced enterprise as a result of the application of the NChP which is established for the materials of the plant which has more backward technology or wages with regional coefficients. if one delves into the process of forming normatives of net output even at the most advanced enterprise, here too one finds much information for thought. Today the expenditure of material resources is strictly normed, the norms are established and reestablished by the higher agencies, and the labor normatives are practically all in the hands of the enterprise. There are, to be sure, reference points--planned labor-intensiveness which are determined by the developing institutes. But since the developers are striving for an effect, it is unthinkable to reduce them, or else they do not play any role in price setting at all.

According to the provisions the price should be established before the beginning of series output, and therefore the labor-intensiveness is taken with "crude" technology, taking into account a possible reduction. In the majority of cases the labor-intensiveness is determined by experience, which contains elements of conventionality. This, naturally, guarantees with the greatest probability that the enterprise will save and not lose money. Experimental norms are refined with time and become technically substantiated, but the NChP, because of its stability, can produce a savings on wages for years, but try to figure it out: was this savings earned or not?

These are problems which, in our opinion, require solutions under the new conditions of management.

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## INTENSIVE DEVELOPMENT OF FERROUS METALLURGY DISCUSSED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 8, Aug 86 pp 75-84

[Article by V. G. Urchukin, general director of the Chermetmekhanazitsiya NPO (Dnepropetrovsk): "Impediments to Renewal"]

[Text] Ferrous metallurgy is a key branch of industry which exerts an immense influence on the development of the entire national economy. At the June (1985) Conference of the CPSU Central Committee on Acceleration of Scientific Technical Progress it was subjected to serious criticism for its orientation toward extensive methods of management. "During 15 years ferrous metallurgy, for example, has been allotted 50 billion rubles in capital investments. A large part of this was used for new, and noncomprehensive construction, while no attention was devoted to technical reequipment of enterprises," said General Secretary of the CPSU Central Committee M. S. Gorbachev at the aforementioned conference. He noted that because of the incorrect technical policy the branch was unable to cope with its assignments for either the 10th or the 11th Five-Year Plans and that this state of affairs requires radical changes.

The Basic Directions for the Economic and Social Development of the USSR During 1986-1990 and the Period Up to the Year 2000 set for ferrous metallurgy the task of accelerating technical reequipment of reproduction, increasing the proportion of progressive technological processes—smelting of oxygen converter steel and electric steel 1.3-1.4-fold during the 12th Five-Year Plan, doubling the smelting of steel by the continuous method during this same period, improving the structure of metal products, and increasing the volume of prepared products without increasing the production of iron and with an essential reduction in the expenditure of coke.

In this issue you may read materials about problems of intensification of production in ferrous metallurgy.

For a long time the production of metal products has been increased mainly as a result of the construction of new shops and enterprises while keeping wornout and obsolete units and equipment in operation. But the demands on the quality and technical level of metal and rolled metal have increased and there is a greater need to reduce the proportional expenditures of raw material, energy, fuel and labor resources. All this has made it an immediate and urgent task to accelerate the technical reequipment of existing enterprises and raise their technical level.

The task of accelerating the renewal of equipment becomes more important, on the other hand, because repair expenditures on maintaining existing equipment in working condition are increasing each year. In 1983 they exceeded 4.1 billion rubles (for comparison, the capital investments allotted to the branch for that year amounted to 3 billion rubles).

The low rates of updating of technical equipment are explained by many factors, the main ones being: the lack of provision of the branch with new metallurgical equipment; the more rapid growth of the cost of new equipment compared to the change in the technical level and reliability; the lack of interest and lack of preparation of branch planning institutes and construction ministries for performing the increased volumes of work for updating existing fixed production capital instead of carrying out new construction.

The intensification of the economy presupposes that the technical level of the new machines will rise more rapidly than their cost will increase. They should provide the consumer with additional savings as compared to the technical equipment that was previously used for similar purposes, and the real savings should be manifested in the sphere of operation and not proposed or applied in preliminary calculations when developing design documentation. At first glance, the difference between these two concepts is clear to everyone: the developers, manufacturers and consumers of equipment and, of course, the agencies of the USSR Gostandart, the USSR State Committee for Prices and the USSR Gosplan. But in reality the situation is quite different. Why? From our standpoint, the reason lies in the fine points of the fundamental standards and of their normative and technical documents which regulate the delivery for production, evaluation of the technical level and certification of the quality of unique equipment that is created in individual In addition to the Ministry of Nonferrous Metallurgy, such equipment prevails in the Ministry of Nonferrous Metallurgy, the Ministry of the Chemical Industry, the Ministry of Power and Electrification and a number of other branches.

Taking advantage of deviations and weak spots, the Ministry of Heavy Machine Building, for example, has "certified" in the highest quality category (or, which is the same thing, in quality group "A") in the stage of the technical plan practically all of the rolling mills constructed or reconstructed in ferrous metallurgy during the past 15 years, and also the agglomerate and roasting machines, machines for continuous smelting of blanks, a considerable

proportion of the equipment for the coke furnaces with large volumes and many other unique pieces of equipment and units.

But what about the results of their operation? What about those quality indicators that were predicted by the developer? Everything is very simple. During the stage of the technical plan they were assigned a quality category for the expected indicators, as a rule the highest (or in order not to sound absurd, they called it group "A" of quality) and the developer and manufacturer receives an increment to the price. But the actual indicators—this is a matter for the operators. If it turns out that the equipment does not work, the manufacturer makes it over again, but "he developer (if they have not forgotten to bring him in for supervising the installation) reworks the documentation for individual units. This might be all. It was in the highest quality category and there it remains.

Thus the consumer ends up completely dependent on the manufacturers and developers. After all, if he has no funds for obtaining equipment, nobody will even talk to him about making changes. Everyone understands that machine builders cannot work without capital. But not everyone understands that metallurgists cannot fulfill the plan with malfunctioning equipment which, in the stage of the technical plan was said to correspond to or surpass the best domestic and foreign models.

Among the indicators of technical equipment which can actually be established and evaluated only according to the results of operation, the most significant are: the possibility of producing high-quality metal products, indicators of reliability, the suitability for repair, the level of mechanization of the operations, the proportional productivity of the equipment and certain others.

The continuity of metallurgical production increases the requirements for reliability and suitability for repair, especially units with large capacities, since idle time on any mechanism causes the whole metallurgical section to close down, and frequently the entire plant as well. For a long time these indicators were not taken into account when determining the prices for metallurgical equipment, which affected the growth of repair expenditures. Thus the actual expenditures on repair of agglomerate machines per ton of agglomerate amounted to 0.9 rubles per ton while they were planned for 0.23-0.35. And the proportional expenditures of the repair of the most powerful mills used at the Severnyy and the Lebedinskiy or enriching combines exceeded 1.84 rubles per ton of concentrate compared to 0.32 rubles per ton when operating less powerful spherical grinders at the Yuzhnyy Ore-Enriching Combine (Krivoy Rog Basin).

In many cases the rotary car dumpers delivered by the Dnepropetrovsk Plant for metallurgical equipment are characterized either by extremely unsatisfactory operational indicators or they do not work at all. The metallurgists are expending immense resources and paying large fines for the idle time of the cars. In order to avoid this they were forced to remake many units of the car dumpers so as to eliminate sudden breakdowns and down time. Moreover, as experience in operating them at the MMK, Zapsib and other enterprises showed, the latest car dumpers of the VRS-93 type were even less reliable than similar mechanisms that were 10 years old.

Metallurgists are making large complaints about the operational indicators of coking equipment. The use of hydraulic drives for coke-pushing machines manufactured by the Southern Ural Machine-Building Plant not only did not increase but, on the contrary, reduced their reliability. One can frequently observe oil leaking out of the hydraulic systems and pumps that refuse to operate. Frequently repair is made more difficult by the large diversity of hydraulic cylinders that are being used and the bulky control panels. The cable does not meet the conditions for operation. Similar shortcomings characterize the work of the coal-unloading machine manufactured by the plant of Slavtyazhmash as well. Many of its mechanisms could not be put into operation at the Altay and Zaporozhye chemical plants or at the Magnitogorsk Metallurgical Combine. The systems for remote control of mechanisms typically do not work very well.

The bearings are not very reliable during the operation of rolling mills. The hydraulic systems are also unreliable here and there is a great deal of oil leakage in the lubrication systems. The main lines of machine tools in the units for cutting metal are not very reliable.

The facts that have been adduced are apparently enough to be convinced of the essential difference between the level of quality which the developers have created for advertising in the stage of the technical plan, and that which exists during operation.

But why is the certification of quality not done after the equipment has been put into operation or even when it has reached its planned capacity? One of the deputy ministers for heavy machine building, when asked this question, answered: "We would drive all the designers away if the final evaluation of quality were not done in the stage of development of the documentation. They would be deprived of a source of bonuses."

From the standpoint of the state the quality of the basic technological equipment in ferrous metallurgy should be certified only according to the result of operation for at least a year at the planned parameters. As for the designers, naturally, they should be provided with incentives during the process of the lengthy development, but not at the expense of the consumer. In our opinion, there are many ways to provide them with incentives. One of these is incentives from the YeFRNT—the Unified Fund for the Development of Science and Technology of the Ministry of Heavy Machine—Building with a subsequent return by the enterprise of bonus funds from deductions from increments to prices paid by the consumer if the actual indicators of operation of the equipment correspond to or surpass those which were established in the technical assignment.

At a conference in December 1982 of metallurgists and machine builders of the Ukraine on increasing the reliability and the suitability for repair of metallurgical equipment, a suggestion was made to set the price for equipment on the basis of comparing the proportional total expenditures of the new and the existing equipment for similar purposes. Here in the proportional total expenditures determined per ton of metal products produced one should take into account, in addition to the cost of the equipment, expenditures on its

repair and operation during the period up to the first capital repair job. This would make it possible to increase the significance of the indicators of reliability and suitability of equipment for repair as well as the delivery of this equipment in complete sets.

After 1 January 1982 when the prices for metallurgical equipment were increased (without changing its productivity or reliability) by 130-220 percent as compared to the wholesale prices that were previously in effect, the metallurgical plants became less interested in updating existing equipment. Thus the cost of two-belt machines for casting iron increased by 188.3 percent without any change in their basic characteristics; converters—168.7 percent, steel backup rolls with hot rolling and mechanical processing—by 182.36 percent, and work stands for slabbing-blooming mills—132 percent.

With a limitation on the funds allotted for construction and repair-operational needs, the increased cost of metallurgical equipment without raising its technological level became a serious factor that impeded the updating and technical reequipment of the branch. But the branch did not receive enough even of this kind of equipment. In 1965-1970 ferrous metallurgy was allotted more than 5 percent of technical equipment that was produced by all branches of machine building, and in subsequent years the deliveries were almost cut in half while the production of prepared rolled metal increased by more than 60 percent. Even in the Ministry of Heavy Machine Building there was a reduction of the proportion of metallurgical equipment in the overall output of commercial products: at Uralmashzavod—from 25.7 percent in 1970 to 14.7 percent in 1980 and in the Novokramatorskiy Mashinostroitelmyy Zavod PO—from 33.8 percent to 25.2 percent. In the Zhdanovtyazhmash Production Association the proportion of metallurgical equipment in the overall volume of production did not exceed 7 percent.

The basic directions for technical reequipment of existing ferrous metallurgy enterprises are:

the acceleration of the replacement of marten production of steel with converter and electric steel smelting along with the development of its processing outside the furnace;

the changeover of smelting of steel to machines with continually cast billets instead of pouring into molds;

the updating of the existing rolling mills and lines for thermal processing of metal products.

The evaluation conducted in 1983 by the commission of the USSR State Committee for Science and Technology of the Technical Level of Metallurgical Equipment that is being produced confirmed the shortcomings in the quality and technical level both of metallurgical machines and of batching items that are used.

There is no system of sequential planning of mechanical, energy and electrical devices and systems of control for a unified, technologically interconnected complex of equipment for converter and electric steel smelting production. And so far there is no doubt about it. Under these conditions it would be

simpler for the Ministry of Heavy Machine Building and the Ministry of the Electrical Equipment Industry to manufacture equipment separately and not in the form of a system of machines, but as individual mechanisms without means of comprehensive mechanization and automation.

To be sure, not everything depends on enterprises of the Ministry of Heavy Machine Building, which for their part are extremely unwilling to provide sets with equipment with instruments, electrical equipment, hydraulic equipment, pneumatic equipment and other items for general machine-building purposes of the associations and enterprises of the Ministry of the Electrical Equipment Industry, the Ministry of Instrument Making, Automation Equipment and Control Systems, the Ministry of the Electrical Equipment Industry, and the Ministry of the Machine Tool and Tool-Building Industry. It is necessary for joint development of metallurgical machines to be organized by specialists of all branches participating in their creation. The decree concerning the improvement of the economic mechanism and the stimulation of the acceleration of scientific and technical progress envisions a number of measures in this area. They will play their role. The introduction on 1 July 1984 of the new policy for certifying products in two categories of quality is also exerting a positive influence on the solution to the problem. But the measures that are being applied are turning out to be not effective enough because of certain omissions in the certification of products on the part of the USSR Gosstandart and in price setting-on the part of the State Committee for Prices.

Thus the USSR State Committee for Price: with the agreement of the State Committee for Science and Technology and the Gosstandart, has permitted the establishment of incentive increments to the wholesale price without conducting certification for metallurgical equipment that is intended for reconstruction, in the amount of 50 percent of the economic effect. With the introduction on 1 July 1984 of the new policy for certification in two quality categories this policy was not abolished. Moreover, the USSR Ministry of Heavy Machine Building and Gosstandart are publishing a joint order for simplifying the certification of metallurgical equipment which will allow them, with the agreement of the client, not to develop technical specifications for items that are to be used only once. The State Committee for Prices is permitting the establishment of limit prices for metallurgical equipment without preliminary registration. These omissions impede the implementation of the tasks that have been earmarked. And the Ministry of Heavy Machine Building has gone further, without the agreement of the USSR Ministry of Nonferrous Metallurgy or the USSR Ministry of Ferrous Metallurgy, but with the permission of the USSR Gosstandart, has included among products that are not certified in the two quality categories all metallurgical equipment intended for technical reequipment of unit production.

We should also like to draw attention to one more aspect. Machine building does not supply ferrous metallurgy with spare parts for the existing equipment or means of mechanization for the mining-ore, refractory or coke chemical subbranches or for agglomerate, blast furnace or steel-smelting production. The halting of deliveries of new machine tool equipment to nonmachine-building ministries could accelerate the technical reequipment of branches of machine building. The overall statement of the problem of the distribution of new machine tool equipment is probably correct. But then what will happen to the

metallurgists if they do not produce spare parts, replacement equipment or means of mechanization for units and equipment that are operated under difficult conditions in volumes that exceed by a factor of 1.4 the overall production of spare parts in the Ministry of Heavy Machine Building? How will they do without machine tools? Such a solution can lead in the near future to increased idle time of the basic metallurgical equipment.

The Ministry of Ferrous Metallurgy has taken certain measures to prevent the delivery of unreliable metallurgical equipment with low indicators of suitability for repair. Since 1984 the evaluation of its quality has been done on behalf of the branch by the All-Union Scientific Research Institute of Mechanization of Ferrous Metallurgy machinery. Its task is to improve and increase the reliability of existing units and, in conjunction with the manufacturers of metallurgical equipment, to do the same with new equipment. Moreover, the institute should begin its work in the stage of the development of technical plans. Increasing the reliability and suitability of new equipment for repair by 4-5 percent per year is tantamount to saving more than 42 million rubles in ferrous metallurgy just by reducing repair expenditures. The institute has been assigned the task of coordinating the limit prices with the Ministry of Heavy Machine Building.

In 1984 on the basis of the All-Union Scientific Research Institute of Mechanization of Ferrous Metallurgy, the experimental plant and two repair and adjustment administrations, the Chermetmekhanizatsiya NPO was created. Engaged in the operation of equipment and the investigation of causes for its premature breakdown, the NPO has accumulated data not only on the resource of operation of each part until it breaks, but also it has revealed causes of premature destruction of components of the equipment. The association and its institute are developing new technological processes for manufacturing spare parts and replacement equipment. A great deal of attention is being devoted to the restoration of worm-out parts and components of equipment through plasma dusting and surfacing. The volume of this technology is constantly increasing and now comprises more than 40 percent of the overall volume of the restoration of spare parts. The durability of the parts installed with plasma surfacing increases 3-6-fold.

Moreover, because of the short service life of new equipment at a number of metallurgical combines, even before it is installed certain components are preliminarily strengthened with plasma surfacing. Therefore it is expedient to considerably expand the utilization of hardening technology with plasma and laser surfacing in machine building and in all branches of industry.

There is a need to combine the efforts of machine builders and those who operate metallurgical equipment in order to reduce not only the expenditures on the creation of the technological equipment, but also the total expenditures on the entire service life. We need a unified comprehensive program for raising the technical level, reliability and suitability of the complex of equipment for repair, first and foremost steel smelting and rolling

productions. At the same time it is necessary to take decisive measures for eliminating narrow departmental interests of the manufacturers of equipment to try, through partial concessions by the Gosstandart and the State Committee for Prices, to preserve the production of outdated metallurgical equipment with low indicators of reliability.

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#### DEVELOPMENT OF IRON ORE SUBBRANCH DISCUSSED

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[Article by F. K. Alekseyev, candidate of technical sciences, deputy director of the Scientific Research Mining Institute for Scientific Work (Krivoy Rog): "For Intensive Development of the Iron Ore Subbranch"]

[Text] In recent years there has been a tendency toward reduction of the growth rates of the extraction of iron ore. The situation that has been created leads to a disproportion between the mining and the metallurgical subbranches. Under these conditions the problem of mobilizing intensive factors of the development of the mining subbranch of the USSR Ministry of Ferrous Metallurgy becomes especially crucial.

Thus in the Krivoy Rog Basin, the leading supplier of iron ore raw material, in 1984 the production of concentrate amounted to 86 percent of the planned level. The main reason for the reduction of the volumes was that the oreenriching combines (GOK) are not providing their enriching factories with sufficient quantities of crude ore.

During the 9th Five-Year Plan the Krivbassrud Production Association introduced 32 percent more fixed capital than it did under the 8th, and under the 10th--80 percent more (in terms of value). Moreover, in 1984 the output-capital ratio dropped by almost 50 percent as compared to 1970.

Calculated expenditures are constantly increasing. The production cost of a ton of ore extracted by the underground method in mines of Krivbassrud PO in 1984 had almost doubled as compared to 1970. From 1979 through 1982 the production cost of a ton of ore exceeded the release prices. In 1982 the wholesale prices for ore had increased and the association again became profitable. But capital investments per ton of extracted raw material are increasing from year to year. During 1984 alone they increased by 40 percent.

Taking into account the fact that there are fewer and fewer deposits suitable for open pit working, it becomes necessary to start to use deposits that are located in complex hydrogeological conditions (like the Yuzhno-Belozerskiy and Pereverzevskiy in Zaporozhye Oblast, and the Yakovlevskiy in the Kursk Magnetic Anomaly). The time periods for constructing mining enterprises for

working such deposits are increasing. While previously the GOK in Krivbass with a capacity of 8-9 million tons of concentrate per year was constructed in 5-6 years, now the construction, for example, of the Zaporozhye Iron Ore Combine No 1 (ZZhRK-1) with a capacity of 6 million tons of ore took more than 10 years. The estimated capacity of GOK's were previously assimilated in 1-1.5 years, while the ZZhRK-1, which was put into operation in 1969, even up to the present time is working at 50 percent of its capacity.

The decisions of the 27th CPSU Congress set the task: "to comprehensively utilize natural and material resources, and eliminate the maximum of losses and unproductive expenditures." Yet, according to the plan for development and distribution of enterprises of the mining industry for ferrous metallurgy up to the year 2000, which was approved in 1984, capital expenditures for iron ore enterprises of the UkrSSR Ministry of Ferrous Metallurgy under the 12th Five-Year Plan are to increase almost 1.5-fold while the volumes of production of commercial iron ore will even decrease. path of development for the subbranch cannot be called efficient. In our opinion, the solution to the existing situation consists in changing the direction of capital investments and mobilizing intensive factors of development. Funds should be invested first of all in the implementation of measures for improving the utilization of previously created fixed capital, thus achieving efficient utilization of the natural resources. This will make it possible to increase the rates of extraction of iron ore with less expenditures.

In the Krivbass there is a tendency to continue to go deeper for rich ore. But, in the first place, deepening the mines requires a general reconstruction of them, which up until the year 2000 will cost hundreds of millions of rubles. In the second place, when one goes deeper in the zones where the earth caves in one loses supplies of ore with a content of 40-47 percent iron amounting to billions of tons. If these ores were utilized in in-depth intervals of 900-1,500 meters, the ore supplies in Krivbass could be increased 1.7-1.8-fold. The technology for enriching this type of one was developed by the Mekhanobrohermet Institute. And just the fact that it was not promptly applied has led to an unjustified reduction of underground extraction of ore in the Krivbass. If the introduction of this is delayed further, in order to work deposits at a depth of more than 1,500 meters it will be necessary to spend considerable amounts of money on reconstruction.

Attention is drawn to the fact that large capital investments in individual measures are not producing the expected results. Among them are attempts to solve one of the most difficult problems of the mines—transportation. A number of mines have introduced cyclical—flow line technology (TsPT). As with any other transportation systems, the utilization of dump trucks is mandatory with the TsPT. The introduction of the TsPT, without improving anything and without eliminating anything from the existing mining transportation equipment and without even reducing the quantity of it, has made it necessary to develop and even create new design organizations and enterprises for producing heavy conveyors, transporter belts and electrical equipment. Under difficult conditions when the distance of transportation reaches 3-4 kilometers and the height of lifting 150-200 meters and more, with the lack of unloading areas the automotive transportation breaks down quickly and the chain for

transporting the mass of one from the working place to the enriching factory and the dumps is broken. The acquisition and utilization of large dump trucks, both foreign and imported, for the mines of ore-enriching combines made everything seem all right during the initial period. The volumes of mining work increased and the enterprises began to operate more stably. But this did not last long.

In our opinion, it is necessary to accelerate the changeover of the mines of ore-enriching combines to the utilization of more reliable, economical and productive transportation—rail. Nor can one forget about the circumstance that the proportional energy expenditures on rail transportation are approximately one—20th of those with automotive transportation. Automotive transportation in any transportation systems, including with the application of the TsPT, should be used within the mine mainly when transporting cargo over a distance of no more than 1.5 kilometers and lifting to a height of up to 60 meters, as science recommends.

It is possible to bring rail transportation into the working zone of the mines using tunnels as is done in the Bingham Mine (United States) and the Sarbayskiy Mine of the Sokolovo-Sarbayskiy Ore-Enriching Combine, and then up to the work face as it is done in the Tsentralnyy Mine of the Apatit Combine.

The implementation of this nontraditional technical measure does not involve the need for creating new technical equipment as other transportation systems do. The means of transportation (locomotive units and dump cars) are seriesproduced by our industry.

The introduction of such a transportation system, which makes it possible to change over to resource-savings technology for doing mining work in the mines, in addition to the aforementioned advantages, will make it possible:

to save considerable capital investment by reducing the frequent costly reconstructions;

to eliminate from the technological process labor-intensive and costly work force constructing portable railroads and capital highways in the mines;

to increase the productivity of the locomotives 1.5-2-fold;

to considerably improve the condition of the atmosphere in the mines.

The Yuzhgiprorud Institute has developed a plan for reconstruction of the Pervomaysk Mine of the Severnyy GOK for working down to a depth of 300 meters with capital investments of more than 130 million rubles (incidentally, this is already the second plan). The reconstruction carried out according to the first plan, on which about 70 million rubles were spent, turned out to be worthless. After the second reconstruction (1983-1990) the normal operation of the mine, as was earmarked in the plan, will not be provided for until 1995. This means that during 1991-1995 it will be necessary to manage to conduct a third (and not the last) reconstruction, which will no less costly.

But yet this same Yuzhgiprorud Institute as early as 1973 developed technical and economic substantiation for the reconstruction of the Pervomaysk Mine using sloping railroad tunnels costing 111 million rubles, which was recommended by the board of experts of the USSR Gosstroy for implementation after adjustment in response to the remarks. When these decisions were implemented (as was noted in the TEO) there would be no need to conduct repeated reconstructions for further deepening the mine. Even when changing over to underground work it would be necessary only to deepen the tunnels. For more than 10 years the plan has not been touched.

It is necessary for the USSR Ministry of Ferrous Metallurgy, combining the solution to long-range plans with current ones, to take a clear position for more rapid development of the railroad subbranch.

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#### KUZNETSK METALILIRGICAL COMBINE RECONSTRUCTION DISCUSSED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 8, Aug 86 pp 89-96

[Article by Mikhail Berkovich (Novokuznetsk): "Metallurgy Enthusiasts and a Backward Shop"]

[Text] The document of the certification commission concerning the startup of the first furnace of the Electric Steel Smelting Shop No 2 of the Kuznetsk Metallurgical Combine (KMK) was signed on the last day of 1980. The life of this new shop is counted from that moment. And when people speak about the prospects of the combine, as an example they refer to this shop. Here, they say, you will see that not all of us are working according to the old way, large electric steel smelting productions are making their appearance here!

And let us note that this production appeared at an enterprise which has metallurgists of the highest qualifications who are able to smelt steel of the highest quality. So the latest technical equipment has been placed in reliable hands. Obviously this was the main consideration when determining the place of the construction of the first large electric steel-smelting shop in Siberia. In the end this shop could have been located in some other place, but not in Novokuznetsk, where even without this the ecological environment is overloaded, and not at the Kuznetsk Metallurgical Combine which has plenty of problems of its own.

During the more than half-century of its history the combine has exceeded its planned capacities more than 3.5-fold in all of the sections, and today it is squeezed as in a vise within its own territory, which was not intended for such a gigantic production....

In order to understand the influence of Electric Steel-Smelting Shop No 2 on the affairs of the combine one must recall the old problems. The more so since not very much has changed here during the past two five-year plans.

Even before the Great Patriotic War the combine assimilated its planned capacities for producing iron, steel and prepared rolled metal, and during the war years it played an immense role in satisfying the needs of the front. Half of the heavy tanks were closed in Kuznetsk armor. The KNK is the only metallurgical combine in the country that was awarded a military order (Kutuzov First Degree).

As early as the beginning of the 1940's it was necessary to reconstruct it. But this was not all. It was necessary to think about a sharp increase in the output of high-quality steel. And the combine's metallurgists honorably coped with this task. They worked on equipment which was in need of capital repair they patiently waited until the war was over. Then it would be possible to catch their breath and reconstruct the enterprise. But then it was necessary to restore the damaged cities and villages. The state did not have enough money for everything. Then the assimilation of the virgin and long-fallow land began. Again metal was needed. And the combine had to stew in its own juices and increase its production capacities as a result of engineering thought, streamlining and invention, which led to an aggravation of the disproportions between the basic and auxiliary productions.

During the second half of the 1950's the first plan for reconstruction appeared. It envisioned the construction of a fifth blast furnace, an oxygen converter shop, two coke batteries, a new roasting furnace and other things. But they did not do what had been planned. They constructed a blast furnace and two coke batteries--and they stopped there. They began the construction of the Western Siberian Metallurgical Combine, and all the funds of the staff of the branch began to be sent there. The KMK was left in an even worse position than it was during the beginning of reconstruction. disproportions were exacerbated. With the introduction of the fifth blast furnace there appeared more than a million tons of "excess" iron, which the steel-smelting production could not process. It was necessary to send it to the Western Siberian Metallurgical Combine where the capacities of the oxygen converter production were not fully loaded. They constructed mobile mixers and began to ship smelted metal across town over a distance of 25 kilometers. Here certain specialists are proud of such a "flight" of technical thought: they were the first to ship hot iron! There was nothing to be proud of: this is an example of technical illiteracy. Hot metal should be processed in the place where it is smelted so as not to lose heat en route.

Even today the pilings jut out of the foundation pit which was dug for the new roasting shop as early as the 1950's. And in the blast furnace itself they "forgot" to construct an installation for smelting additional iron.

Time passed and the metallurgists did not sit with their hands folded. While in the 1950's they more than doubled the plan capacity, by the middle of the 1970's they had already more than tripled it. But this was not all. The industrial buildings of the basic productions had become so dilapidated that they had begun to fall down. The coke chemical production, the Abagurskaya Agglomerate Factory, ended up in the worst situation. Large capital investments were needed in order to return it to working order. Today problem No 1 is the condition of the production facilities of the marten furnace section, which is also extremely dilapidated.

And even the very production of steel by the marten method could not satisfy anybody today. It is necessary to have modern technology for producing metal in all sections, but mainly in the steel-smelting section. In fact, why in an age of ladle metallurgy do we spend 10-12 hours smelting in a marten furnace when there is a converter which melts down the charge in 45 minutes.

Since 1978 they have been unable to assimilate the planned capacity in the division for thermal processing of rails here. There is not enough metal. And at the same time more than 25 percent of it leaves the section because of the outdated technology for smelting steel and the formation of blanks: a continuous smelting machine is needed. The quantity of defective work and the number of unordered smeltings are also great.

All this has awaited solutions. And here the electric steel-smelting shop appeared as a solution. The shop was intended not only to be large (a million tons of steel a year) but also the most modern, capable of competing with the most advanced technologies of the world. Here it was intended to create high mechanization of labor on the basis of machines for continuous smelting of billets, divisions for bulk materials, bunker and ladle processing of steel, and so forth. There were to have been four electric furnaces that could hold 100 tons each. It was intended each year to start up one furnace along with its own complex. For example, with the first furnace it was intended to start up a division for bulk materials and bunker production. The complex of the second furnace included an oxygen line from the Western Siberian Metallurgical Combine, and the third complex was to have machines for continuous smelting of billets.

But they constructed the first furnace and after it the second (with a reduced complex) and then the creative fervor of the managers of the USSR Ministry of Ferrous Metallurgy dried up. Today their technological ideas have turned in quite a different direction. It is necessary to construct the converter shop immediately: not wait until the building of the marten furnace section has fallen down!

But what about the electric steel smelting shop? Where is the third furnace (not to mention a fourth)? So far nobody can give an answer to these questions. And today the pilings jut up, just as they jutted up from the foundation pit which was dug about 30 years ago for the blooming mill which was never constructed either.

How does one explain such a technological "policy"? And in general what kind of a method of construction is it when one shop is divided into several sections and everything revolves around situations in which the line does not extend to the last sections?

The head engineer of the plan from Sibgipromez, N. D. Kopysov, thinks that it is very advantageous to construct such objects and parts: if they were all released at once it would be necessary to wait 3-4 years for electric steel, and this way in the second year one furnace is already producing metal, and then it is joined by a second furnace, and the construction continues.

It was strange to hear these words, if only because of the notorious experience of Kuznetskstroy which remains in many people's memories. They applied so much pressure to the head engineer, I. P. Bardin during the 1930's in order to make him put the blast furnace into operation as quickly as possible. And he answered: "I am building the plant, not the blast furnace." As a result, in one year at the combine they put the coke batteries into

operation, obtained iron and steel, rolled blooms and, finally, completed the metallurgical cycle—produced prepared rails. I repeat: this was the startup program just for 1932. And in general, during that time in 2.5 years they constructed a gigantic plant—from the foundation to the decorations on the roof. On a marsh. A half-century later we were constructing one plant (even if it is the largest one) and we are extending its startup into operation (according to plan!) over many years.

Possibly N. D. Kopysov is right concerning the advantages of construction in parts, but dividing up startup complexes sometimes involves considerations that are very far removed from the work and the technology.

The electric steel smelters are proud of their production. They have done a good deal to increase its effectiveness. And they have not only overcome the difficulties of the startup period under the conditions of an incomplete shop, but they have also introduced their own innovations. The main one is the water-cooled hangups which increase the durability of the lining. Now it can withstand 1,500 smeltings—10 times more than other similar furnaces. Of course, the productivity of the units also increased this way. And the plan is being fulfilled.

But if one is to speak about the planned capacities of the two furnaces, they were not assimilated until 1985 when the shop, finally, produced a half-million tons of steel. The results of the 4 preceding years look like this: 1981—147,200 tons; 1982—251,000 tons; 1983—385,000 tons; and 1984—453,000 tons.

But even in 1983 the electric metallurgists announced that the planned capacity had been reached. How could that be?

"We do not have any oxygen," they say.

The fact is that initially they began to construct the shop and ther they recalled that it required oxygen. They began to construct an oxygen block at the Western Siberian metallurgical combine and extend an oxygen line over 25 kilometers through the bed of the Tom River. How can one reach the planned capacity without oxygen? This turned out to be a problem that was not easily rectified: they revised the capacity and took into account the technology with a defect—no oxygen. And they "reached" it.

It is not just a matter of oxygen. For a long time the new electric furnaces did not have enough so-called sized scrap—large chunks of scrap metal, without which the electric furnace cannot operate normally. But there has never been enough of this, and marten furnaces need it as well. And the electric furnaces stood idle for a long time. Now, as specialists of KMK assert, the problem of scrap has been solved, but at the expense of all those marten furnaces.

But let us return to the problem of starting up in sections. In this case the ministry acted for purposes of economizing on state funds. The aforementioned sections for both materials and the bunker section were to have gone into operation along with the first furnace. But they were moved to the complex

for the second furnace (out of considerations of economy) and they did not go into operation until 1985. Planned for obtaining high-quality steel, the vacuum machine somehow fell unnoticed out of the general complex (because of the same considerations), and at the expense of the division for ladle metallurgy the plan was made less expensive. Now the combine itself is making the same kind of installation. But yet the shop has been operating for 5 years without it!

And what happened as a result? They arranged more modern, highly productive production, and they received a deformed shop. One consolation is that it has the best indicators in the country. But this is evidence of the level of work of the other shops more than anything else.

In 1983 in Novokuznetsk there was a conference on mechanization of manual labor. The chief of the sector for mechanization of the USSR Ministry of Ferrous Metallurgy, M. V. Malakhov, gave a paper at it. In his words, labor expenditures at our enterprises are unjustifiably high. When speaking about agglomerate production, there are some mitigating circumstances—the updated equipment in particular. But the oxygen—converter and the electric steel—smelting productions are quite new, and why is labor productivity low here? Bothered by this question the ministry instructed its specialists to check and see what was happening. The result of the investigation showed that today they are including in the plans solutions that are less effective than those included in the objects that were put into operation 10 or even 20 years ago.

And here again I should like to turn to the experience of Academician I. P. Hardin. When veterans speak about his outstanding role in the construction of the Kuznetsk Combine they always emphasize especially that he collected in his pet project all the newest and most advanced of that which was known at that time in science and technology.

Cutting up the complexes, making them less expensive and utilizing the best technology as well as the imperfect construction led to a situation where the shop not only was not equal to the best foreign productions, but for 5 years was operated with technical and economic indicators that were far from the planned parameters. For example, in 1985 labor activity per worker per month reached 89 tons, and according to the plan it should have been 140. The production cost of 1 ton of steel should have been no more than 97 rubles, but it turned out to be (not counting the costly nonrusting steel) in the range of 106 rubles. Consequently, 4.5 rubles a year are "floating away."

And if one calculates the losses associated with this, as it were, construction, they can hardly be covered by the advantage from sequential introduction of the facility.

But w'v during the years of the first five-year plan was Academician Bardin still able to find the best solutions, to construct an entire object, and now people are unable to do this? Let us recall that Kuznetsk, like Magnitka and Dneproges, was constructed by the entire country. Immense forces and funds were concentrated here. This was probably also a matter of the great engineering talent of I. P. Bardin and his ability to maintain control over an unrestrained flow of variants.

The fact is that today the state both has more money and is more powerfully equipped. Who said that it was impossible to construct a shop in 2 or 3 years? But there were so many variants for the reconstruction of the combine! There were so many attempts of all kinds to make the project less expensive, which in the end turned into large losses! One obtained approximately the same "effect" as did the greedy Vartan who wanted to sew seven caps from one sheepskin. And this is why today we must invest what the managers saved previously by cutting the complexes.

For such a large industrial center as Novokuznetsk has become it is important to protect the environment. The technical policy of the USSR Ministry of Ferrous Metallurgy is directed toward concentrating large enterprises in one place.

When they began to construct the electric steel-smelting and sanitation services for the city they hoped that the means of environmental protection here would be at the highest level. But as of today the shop pours out as much black smoke as any marten furnace. Why?

"The design included electric filters from the Semibratovskiy Plant," explain specialists, "which did not undergo the proper testing. This was the only experimental batch, and it turned out to be quite unsuitable for use."

And this mistake must be corrected. Now it will be necessary to replace the filters. It is a lot of trouble, but there is nothing else to do! For the electric steel smelting shop is operating several kilometers away from the center of the city.

Residents of Novokuznetsk must take consolation in the fact that Electric Steel-Smelting Shop No 2 of the Kuznetsk Metallurgical Combine is the best of four similar shops in the branch. But even the technical and economic indicators envisioned in the plan, which are not the best, have certainly not been reached. And nobody can answer the question of when they will be reached. "Unfortunately, we do not know when we will complete Electric Steel-Smelting Shop No 2," says the combine deputy director for capital construction, I. P. Yarmolinskiy. "The need for construction is great and each year the contractors cut the work in our combine. And not only in ours. In Novokuznetsk there is the large Uprstroy Chermet Association, whose very name tells its purpose—to construct ferrous metallurgy enterprises. But if charge its best years, say two five—year plans ago, at our combine and Western Siboc an combines this association assimilated up to 19 million rubles a year, now it assimilates 40-50 million.

Nikolay Petrovich touched upon a longstanding problem with construction in Novokuznetsk which, it seems, affects both the USSR Ministry of Heavy Construction and the USSR Ministry of Ferrous Metallurgy in the same way. The former does not fulfill the plan for the construction of ferrous metallurgy facilities, especially facilities for the protection of nature, and the latter annually reduces allocations on the basis that the funds are not being assimilated. This is one of many reasons why the new electric steel-smelting shop is being "constructed" the way it is.

Incidentally, for the combine the essence of the problem no longer lies in this shop. After long wanderings on the labyrinths of variants of reconstruction, the branch staff and the board of directors of the combine, finally, decided on a variant for future development. It is necessary to realize the intention—first of all to begin to construct an oxygen converter shop. But to do this it is necessary to eliminate the refractory production, and the problem of refractory materials for the combine has not been solved. It is time to stop operating the electric furnace of the Dneprospetsstal Plant, which was shipped in and assembled on the territory of the marten section during the years of the Great Patriotic War. But such a decision has not been made yet.

In this connection there arises the fear: will the construction of the converter production not be carried out according to this same principle, which has not been justified for a long time?

# FOOTNOTE

 A similar discussion of problems of this combine was presented in a selection entitled "Reconstruction of Veteran Plants" (EKO, No 2, 1978), pp 91-127).

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### LOSSES ANALYZED TO REVEAL RESERVES

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 8, Aug 86 pp 97-102

[Article by V. Ya. Yemelyanenko, deputy chief of Odessaglavsnab: "A Claim... for Overexpenditure"]

[Text] The savings on all kinds of resources depends on the introduction of scientifically substantiated norms, the replacement of certain kinds of materials with others, the extensive utilization of secondary resources and the elimination of losses during transportation, storage and warehouse handling. In the article by I. I. Shkolnik and M. Yu. Garkava, "The Path to Scientifically Substantiated Norms" (END, No 11, 1984) in general they correctly reveal the actions and battles for revising and establishing norms which are taking place between the ministry, the VPO and the enterprise, on the one hand, and the Gosplan and Gossnab, on the other. The one group is trying to obtain more while the other is trying to allot less. You read about this and you are surprised: in a unified system of management we have different final goals and tasks.

But the article attempted to relieve the enterprise of the responsibility for overexpenditure as compared to the established norms and limits and to heap all the guilt on the VPO, ministry, Gossnab, Gosplan and others. And the responsibility is considerable: the enterprise (organization) must contribute to the income of the union budget twice the value of the overexpended resources. For the utilization of planned resources for other than their intended purposes the sanctions increase to threefold.

We have been directed toward economizing on all kinds of resources by the widely known decree of the CPSU Central Committee and the USSR Council of Ministers, "On Stepping Up Work for Economy and Efficient Utilization of Raw Material, Fuel-Energy and Other Material Resources" (1981). So we must honestly admit that all of us, from the worker to the ministry, have worked inadequately and in a number of cases simply poorly on fulfilling on this decree. The problems of economizing an resources have been considered in directive documents in subsequent years as well. To be sure, they still believe this when we say that the director and the head bookkeeper will not hesitate to sign an independent "payment" for the aforementioned double (triple) sum of overexpenditure into the budget without weighting until Gossnab agencies do this incontrovertibly.

A stipulation should be made here. I am writing not to protect the honor of the uniform of the Gossnab system or my colleagues from the Donetsk Territorial Administration whom I know well. They are conscientious and intelligently perform the duties assigned to them and look for ways of utilizing resources that are truly economical and efficient.

It is no secret that the number of workers of associations and enterprises, VPO's, branch institutes and Glavsnabs, ministries and departments that are engaged in supply and norm-setting for the expenditure of resources in all branches of the national economy exceed by 10-fold the number of workers in the Gossnab system, including even warehouse workers and loading machine operators.

The plant norms, which are supposed to envision reasonable and technically substantiated reductions, are subsequently considered and approved by a large army of specialists from branch institutes, VPO's and ministries. Then they are used as a justification for applications for resources that are submitted to the Gosplan and Gossnab.

Everything would seem to be all right, but in practice it turns out differently. Our specialists, in the stage of the application campaign and only according to the list of products that are in short supply (there is simply not enough manpower for the other) each year declare increased norms. Thus in 1984 the administrations for delivering products under the jurisdiction of Odessaglavsnab, selectively checked on 8,202 norms, 34 percent of which had been reduced. As a result, they managed to save 2.3 million rubles' worth of resources. Which of the parties is actually trying to economize on material resources and which is doing this only in words?

One can imagine what would happen during the inspection of the norms if in addition to us economists (the most widespread profession in the Gossnab system) there were also technologists, chemists, instrument workers and others. Unfortunately, technologists in various branches are not envisioned at all in the standard staff. With the expansion of the rights of the territorial agencies and their increased responsibility for the condition and monitoring of the savings on all kinds of resources, the Gossnab must eliminate these distortions in our staff. Therefore the dominance of the "papermaking" allotment of funds and the assignment to certain suppliers should be explained first and foremost by the "paper" norms which lay claim to a scientific basis once the consumer starts the ball rolling.

Indeed, the Gossnab should be primarily responsible for providing resources, but the consumers themselves force us to engage in inspections without increasing our staffs. If the matter proceeds further in this direction, for each worker there will have to be an individual inspector.

How, for example, does one conduct an order campaign for the next year? The enterprise defends the orders in March-April on the basis of drafts of plans. A majority of these drafts envision increasing the program as compared to the plan for the current year by 10-20 percent. And these data are signed and attested to by the stamps of the higher organizations. How can one refuse to

sign a document under which it is possible to obtain all the resources one wants? Nobody really bears any kind of responsibility for this "plan." But if one takes into account the fact that it includes increased norms, the overall increase greatly exceeds this 10-20 percent. Thus the artificial deficit and imbalance originate. It would seem that it would be possible to hold those managers who generate such phenomena legally responsible. But insofar as I recall there have been no such attempts because the corresponding normative documents have been lacking. This situation should be rectified immediately. Then the consumer would think twice before giving us inflated orders.

Another example. At the Odessa Plants we checked the expenditure of the basic and auxiliary materials that were included in the estimates. It turned out that they had been increased as compared to the actual need by almost 15 percent, and the orders submitted to the supply agencies for these same items were increased as compared to the actual expenditure up to 40 percent. How does one explain this? Only by the desire to work without effort, utilizing resources uneconomically and effectively.

One can boldly assert that the majority of norms in effect at enterprises and organizations have "fat." Therefore why burden oneself with the introduction of new technology and designs, when each year as a result of "skillful" reduction of this "supply of stability" one could withstand any pressure, even the strongest, for directive reduction of the norms.

When justifying the funds in the Gosplan the ministries and departments, relying on the authority of the branch institutes and the scientific norms that they were supposed to have developed, manage to get the corresponding funds allotted for rolled metal. Then these funds, for various reasons but basically by the fault of ferrous metallurgy, are realized by 85-95 percent. But even under these conditions the output of commercial products, as a rule, is provided for. For machine tools, machines and equipment are not manufactured out of thin air.

I. I. Shkolnik and M. Yu. Garkava consider the increase in the proportional norm of expenditure of coke from 180 to 202 kilograms of conventional fuel per ton of lime to be the greatest victory since the prolonged "siege" of the ministry. Coke has always been the basic raw materials for metallurgists and, incidentally, there is a chronic shortage of it. Metallurgists are looking for ways of reducing its expenditure. And chemists, in addition to developing and introducing a technological process for producing soda without using any coke at all, have started to compete with the metallurgists. The frequent complaints from enterprises about the difficulty of the assignments for economizing on electric energy are questionable. With the increase in energyintensiveness as a result of the reduction of the proportion of manual labor there is an increase in labor productivity and, consequently, also in the If the collectives are given concrete tasks for output of products. economizing on energy resources, as a rule, they are feasible. An example of this is the work of enterprises and organizations of our rayon. In 1984 they saved 25 percent more electric energy than was prescribed by the planning assignments.

Another negative aspect of increasing the norms is the directly proportional growth of above-normative supplies. When analyzing the existing normatives for carryover supplies at enterprises of various machine-building ministries and departments located in our rayon it was established that the majority of them do not have technically substantiated normatives. Moreover, the enterprises of one and the same ministry that produce products that are comparable in metal-intensiveness, labor-intensiveness of manufacture and completeness, have different normatives for carryover supplies. These normatives are in effect for many years. They have been created basically according to the principle of who could "prove" and "scare up" how much. Thus supplies of metal products were established for enterprises of the USSR Ministry of Light and the Food Industry: the Prodmash Plant—for 24 days, the plant for producing food equipment—30 days, and the Poligrafmash Plant—19 days.

There were even more impressive contracts between almost the same kinds of plants of various ministries. There are as many ministries and institutes under their jurisdiction as there are norms! Moreover, for one and the same technological processes (especially in machine building) each department has its own norms for repair and operational needs of the same kind of equipment, and frequently they differ from one another by significant amounts. enterprises there are cupola furnaces with approximately the same volume. Therefore the forms in which the iron is cast have practically no influence on the expenditure of refractory materials. Everything depends on correct operation and prompt repair of the cupola furnaces. Yet the expenditure of refractories differs so strongly at enterprises of various ministries that all branch norms have been increased as compared to the norms created with the Gorkiy Organab Institute of the USSR Gossnab which did not bring the matter to a close. In my opinion it is necessary to establish a unified unionwide progressive norm on the basis of the experience of the leading enterprises. In the example that was given it would be possible to recommend 13-14 kilograms of refractory materials per ton of good casting, while now 17-40 kilograms are extended.

In our economic rayon, as in Donetsk, we have a widespread arbitrary style of figuring out the directive percentage of reduction of the norms. Everyone is cut by the same measure, and differences in the level of technology and material-intensiveness of the products that are produced are not taken into account. If the enterprise is actually introducing waste-free technology and is overfulfilling the assigned percentage of reduction many times over, for the next year, at best, it will be given the average percentage of reduction set for the ministry, and at worst it will be set from the level reached in the preceding year.

This kind of style eliminates any will on the part of the collectives to reduce the norms. And there one will find them developing new products which it is not difficult to grow "fat" again when developing and defending the norms. And it is possible to work quietly and peacefully this way until one is ready for a pension.

Why do the enterprises increase the norms and do anything they can think of to create sufficient supplies? Now there is no quarantee that the supplier will

supply everything necessary promptly, completely and in the assortment that has been ordered. The fulfillment of contractual commitments for deliveries for the majority of associations and enterprises, with the exception of participants in the experiment, has not yet become the main indicator. Just look even when the Central Statistical Administration publishes summaries it does not give a single figure that shows how one branch or another has fulfilled its deliveries. Only the overall volume of product sales in percentages is given.

The loophole for the 2-3 percent leeway for failure to fulfill agreements continues to operate effectively. Many enterprises have adapted to the existing methods for evaluating the fulfillment of contractual commitments. They work very hard on delivering costly products, but those that are inexpensive, even though they have plenty of them and enough consumers, they leave until later. If there are not enough of these products, there is no great harm because they will still manage to stay within the percentage of leeway.

During difficult times everyone looks to the Gossnab, thinking that its organizations are capable and obliged to "save" them. One must recall that the Gossnab in and of itself, with a small exception, produces nothing and is not a state "moneybox." Before taking from it it is necessary to put something in. But who should do this and at whose expense? First of all, the suppliers. In my opinion, it would be expedient to give the Gossnab agencies the first right to distribute above—normative material resources according to the list of the USSR Gosplan.

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#### ADMINISTRATIVE PERSONNEL PROBLEM CONSIDERED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (ENO) in Russian No 8, Aug 86 pp 103-108

[Article by G. P. Alfer and Yu. P. Vinogradov (Leningrad): "Controlling the Number of Administrative and Management Personnel"]

[Text] In solving problems of accelerating scientific and technical progress a decisive role is assigned to specialists and managers. Therefore it is worthwhile to return to such a category of workers at enterprises as administrative and management personnel.

The industrial production personnel of associations and enterprises are divided up for planning and accounting for the numbers into the following categories: workers, students, engineering and technical personnel, employees, junior service personnel and the protection of labor.

Along with the directive establishment of the limit on the number of workers and employees of an association or enterprise, there is a planned number of personnel for each of the aforementioned categories of workers. Additionally, there is a limit on the overall number of management staff workers and the amount of maximum allocations for maintaining them.

Improvement of the structure of the workers as a result of reducing the proportion of administrative and management personnel is correctly recognized as one of the directions for increasing the effectiveness of production by both domestic and foreign economists. The number of AUP (Administrative and Management Personnel) workers and expenditures on their maintenance are under the control of the state: the staffs of management workers of enterprises, organizations and institutions are approved within the limit on numbers established for them. But frequently the annual directive assignments for reducing AUP "are fulfilled without being fulfilled."

Today the indicator of the proportion of AUP is a criterion of the progressiveness of the organization and structure of management both of the branches of industry as a whole and of individual associations and enterprises. Those who are in the lead in terms of this indicator are traditionally considered "poor." These include the shipbuilding branch, where the proportion of AUP is somewhat higher than in related branches. Hence the

more rigid limits and the increased assignments for reducing AUP. Such a situation can hardly be considered corrective when one takes into account that there are no clear-cut criteria which make it possible to justifiably determine the number and proportion of management staff workers depending on the technical, technological and organizational peculiarities of the associations and enterprises. So far the principle of "from the level achieved" is in effect.

According to the existing classification the AUP of an industrial enterprise includes workers of industrial and nonindustrial groups. The first group includes the following categories of workers: engineering and technical personnel (except those employed in technical, design and planning work, and also not including those employed in general plant laboratories); employees; laborers (drivers of service passenger cars, welders, plumbers, carpenters, electric installers and so forth who are employed in plant administration and also computer operators); junior service personnel (cleaning ladies, couriers, attendants and elevator operators employed in the plant cloakroom administration); and protection of labor. The second group includes engineering and technical personnel and employees (people in charge of residential buildings, dormitories, work buildings, plant farms and so forth). The structure of the number of NUP for the individual categories is presented in Table 1.

Table 1--Structure of AUP Workers

Category of Personnel	Proportion, &
Engineering and technical personnel and employees	83.1
Workers	4.1
Junior service personnel	1.8
Protection of labor	7.9
Other AUP workers	1.1
Not industrial group	2.0
TOTAL	100.0

Attention is drawn first of all to the unusual combination of various categories, positions and occupations that are lumped together under one title. Yet more than 15 percent of the workers falling into the category of "administration" are not really that. At the same time the composition of the AUP does not take into account the part of the management staff that performs functions of technical preparation of production or workers in design and technological subdivisions.

One can only make assumptions about what gave rise to such a structure of a AUP, which seems strange in our view. Probably it took form during the years of the first five-year plans when the composition of people with various qualifications, the work methods and the results of work were significantly different in the "technical" and the "management" subdivisions of the enterprises. Today there are no such distinctions. In this connection it seems expedient to control (plan, regulate, account for and monitor) the number of engineering and technical personnel and employees as a whole. Then the proportion of engineering and technical personnel in the overall number of

industrial production personnel would characterize the structure of personnel, and the expenditures on management would reflect expenditures on management of the associations and enterprises.

The planning and accounting for the number of workers in a given category is fairly well worked out: report data are contained in a number of forms of the USSR Central Statistical Administration and planning presupposes the application of the normative method developed by the Scientific Research Institute of Labor of the USSR State Committee for Labor and Social Problems. Thus, for example, in the shipbuilding branch they have developed and put into effect the "consolidated normatives for the number of engineering and technical personnel and employees," which make it possible to plan the number of personnel in the given category, depending on the technical and economic indicators of the associations and enterprises. But the ministry, as before, receives an assignment for reducing the number of AUP and distributes it among the associations and enterprises.

Research that has been conducted has shown that the branch differences in the number and proportion of AUP were conditioned by a number of chartive factors. In particular, the relatively high proportion of AUP in sniperitung was related to a specific feature of the branch: the single-unit and small-series type of production; the large number of plans at one enterprise: the testing and release of ships to the client away from the manufacturing plant, which requires special release bases; the long duration of the cycle of construction, the sizes, the complexity, the existence of a significant number of contracting agents participating in the installation and adjustment of machines, mechanisms and instruments on ships that were under construction, which requires that the structure contain a management subdivision of shipbuilders "especially for the product" (9-10 percent of the overall number of AUP).

The aforementioned specific features of the branch are practically not taken into account when establishing the limit and assignments for reducing the number of AUP. Nonetheless, within the branch they have developed and put into effect a method of norm setting that makes it possible to distribute the assignments among the associations and enterprises taking into account their organizational and technical condition. For a rough evaluation as a consolidated normative one can use a proportion of AUP as an average for the various groups of enterprises (Table 2).

Table 2—Distribution of Average Values of Proportion of AUP in Group of Enterprises of Shipbuilding Subbranch

Group of Enterprises According to Number of Personnel	Average Values of Proportions of AUP, %		
I	14.4		
II	15.4		
III	17.3		
IV	18.9		

As we can see, the largest proportions of AUP are at small enterprise.

Taking into account the complexity of the composition of AUP and the diversity of factors determining the amount, the branch developed a method of norm-setting for AUP for individual categories. The number of personnel in the largest category, engineering and technical personnel and employees, is normed on the basis of "consolidated normatives" that are in effect in the branch. To do this the number of personnel for each of the functions, calculated according to the normative, is multiplied by the coefficient K, which determines the proportion of engineering and technical personnel and employees among the AUP and their overall number. The amount of the coefficient K in terms of the management functions ranges from 0 to 1 (Table 3).

# Table 3--Fragment of Normative of Mumber of Engineering and Technical Personnel and Employees Among AUP

Marker of	(I Er To ar AL	Coefficient K (Proportion of Engineering and Technical Personnel and Employees Among AUP and Their Overall Number)	
01	General (line) management	1.0	
15	Technical and economic planning	1.0	
16	Operational control of basic production	1.0	
18	Organization of labor and wages	1.0	
20	Selection, placement and utilization of personnel	1.0	
21	Training of personnel	0.8	
29	Protection of labor and technical safety	0.7	
22	Repair and technical service	0.6	
20	Provision of production with instruments, fitting	JS 0.35	
02	Design preparation of production	0	
05	Technological preparation of production	0	

The introduction of the coefficient K into the program for calculating the normatives of the numbers of engineering and technical personnel and employees made it possible to calculate the normative of the largest category included in the AUP with the help of a computer. The number of workers and junior service personnel included among AUP is determined by the number of engineering and technical personnel and employees in plant administration. The analysis and processing of the statistical data made it possible to obtain a quantitative dependency between these amounts (Table 4).

The normative number of AUP of the nonindustrial group is determined in percentages of the number of workers employed in it and depends on the number industrial production personnel of the enterprise: up to 3,000 people—11.0; up to 6,000—10.6; more than 6,000—10.0.

The number of workers for protection of labor is determined for the various associations and enterprises according to special provisions.

Table 4-Normative of Number of Workers and Junior Service Personnel Among AUP

	Normative Proportion of Workers and Junior Service Personnel Among AUP From the Normative Number of Engineering and Technical Personnel and Employees Depending on the Number of Indus- trial Production Personnel of the Enterprise, %		
Category of Workers	Up to 3,000		More than 6,000
Workers	4.9	4.4	3.9
Junior service personnel	2.8	2.3	1.8

Thus in the branch they managed to create a normative base for planning the numbers of AUP which takes into account the specific peculiarities of each association and enterprise (numbers, volume and products list of production, number of suppliers and consumers, and so forth).

But still, in our opinion, what has been presented here is only a compromise. The time has come to clearly establish on a statewide scale the composition of the category "Administrative and Management Personnel," limiting it only to engineering and technical personnel and employees who perform work in any of the management functions. Solving this problem will not only contribute to improving the structure of personnel, but will also simplify planning, accounting and control of the number of workers in general and those who perform management functions in particular.

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#### TRAINING IN TEXHNIKUMS EXAMINED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (ENO) in Russian No 8, Aug 86 pp 108-112

[Article by B. A. Semenov, instructor of economics and organization of production of the Moscow Aviation Tekhnikum: "From Individual Tekhnikums--To Their Associations"]

[Text] Have you had occasion to hear about the dynasties of technicians or about the fact that individual conscientious and skilled representatives of the army of specialists of the middle level have remained true to their profession all their lives and have been celebrated by high marks of distinction? Alas, I have not. And yet we have long known that only a highly valued profession evokes a desire to master it. And vice versa. A specialist of the middle level has only two steps in his career: technician and senior technician. Some of them strive to be "engineers" and others—"workers."

I shall show what this leads to using the example of the aviation design bureau in which I worked for more than 10 years as an engineering designer. In the design bureau the engineer and the technician, augmenting one another, constitute a unified whole. The former generally points out the component or unit, does aerodynamic, thermal, durability and economic calculations, enters into dialogue with the computer, and searches for a compromise in the contradictory requirements of planning, manufacture and operation of his brainchild. This compromise assumes the form of concrete parts and their combination in the component or unit. The technician works out the details of this development. He looks at the part through the eyes of various specialists of experimental and series production, in his mind he works with their instruments, and he uses concrete equipment.

On the basis of my own experience I can say that such pairs are very rare in design bureaus. And if they are formed, unfortunately, it is not for very long: up until the point when the technician is transferred to the job of engineer which, unfortunately, is not appropriate for him. Now the former technician is embarrassed to do detail work for others' developments and he himself begins to work with components and calculations. The inability to do this work forces him into the evening or correspondence WZ. But knowledge in a sphere that is new for the given person, as a rule, is always acquired at the expense of a lot of experience where at one time he had excelled. "In

order to achieve something it is necessary to be able to give up something"--so goes the wisdom of the people.

And what has happened to the engineer? After all, he has also felt the poor quality of his work in the details. The blueprint is a final product. like any final product it dispassionately demonstrates the degree of the author's mastery or his lack of preparation. The performance of the functions of the technician require special training, just as other professions do. What about the engineer? Entering the evening division of a tekhnikum does not provide the education that is called higher technical education. he has been taught to perform well "Operation No 1" in a long chain of work for designing new machines, manufacturing, operating and repairing them. The engineer quickly understands that the design bureau values a person who is able to do everything, even if it is in a mediocre way, including acting as a "small factory for producing blueprints." Unfortunately, he is not prepared for such functions. He is faced with a difficult situation of man's conflict with himself. The simplest and most accessible solution is to search for a better application for his capabilities.

Probably no one would argue about the fact that the national economy needs specialists of the middle level. But now does one interest students in obtaining the necessary knowledge, on the one hand, and, on the other, interest technicians in work in their chosen specialty. Now students at the tekhnikum, once they have visited enterprises during production and technological practice, began to understand the indefinite future of the specialty. Some of them, devoting more effort to preparing for the VUZ, take theoretical discipline seriously and neglect practical skills while others, on the contrary, having decided to remain workers, underestimate the subjects. When they come into production many technicians, even during their first years of work, start to think about changing professions. In the situation that has arisen a good deal of the blame goes to the secondary specialized educational institution itself. Turnover of personnel among technicians is only one of a mass of problems which the society is experiencing because of the lack of direction of professional training.

The main task of tekhnikums is to make sure that their graduates have mastered the devices of working in any concrete, narrow area of production to such an extent that in any situation they will be able to apply them simply, promptly and correctly. Learning an occupation means developing a special "mind," a special "hand" and a specific way of thinking which is adapted to solving practical problems.

Which specific kinds of specialists are needed today and will be needed tomorrow in a given industrial center, its plants, its scientific research institutes and design bureaus? How does one provide a material base for their high-quality training? These and many other no less crucial problems are beyond the capabilities of individual tekhnikums that are separated by departmental barriers. According to calculations of specialists, about 200 organizations belonging to various ministries, departments and local soviets are nandling them.

It has long been time to change over to associations of average-sized specialized training institutions. Their undisputed advantage as a result of efficient proportions, narrower specialization and changes in forms and methods of management will be manifested in the same way as they are in industrial associations. In an association of tekhnikums the profile of each tekhnikum will be decided centrally as will the specialty (one or at most two related ones) in which it will begin to train personnel in keeping with the needs of the region, and the training programs will be adjusted; capital investments will be distributed; the material and technical base will be created; and personnel, transportation, living and other problems will be resolved. Training associations should be placed under the jurisdiction of an agency that accumulates departmental forces on a given territory—the ispolkom of the soviet of people's deputies.

The association will be able to provide each tekhnikum included in it with equipment that is necessary for training by redistributing it appropriately, organizing a general training and production combine, and so forth. It is necessary to leave behind the situation in which "there is not enough equipment, but there is surplus equipment." For 50 years now our Moscow Aviation Texhnikum has been graduating heat treaters and assembly workers without having heating or assembly sections. There are no training production shops (UPM's) or sections for machine tools with program control, although there are groups studying these in the evening division. True, the laboratory has two machine tools with program control, but they do not work since the table of distribution does not envision service personnel for them. And so people leave the evening division of the tekhnikum as specialists in whatever is now written on their diploma without ever having seen equipment in operation.

Actually we have a "home" for training and production work in only one occupation. And the machine tool equipment is far from new and frequently there is no work for the students. Let us note that our tekhnikum is the best in the branch, and the UPM is the envy of our colleagues in the secondary specialized school.

Students in the section called "Thermal Processing of Metals" in the advanced courses use the services of the laboratory for metal science in which there are tens of thousands of rubles' worth of instruments and mechanisms. It also has an assigned manager. If one takes into account the fact that the heat treaters go through prolonged technological and production practice at enterprises, that is, they spend no more than 30 percent of their school time inside the tekhnikum, one can imagine the degree of loading on the laboratory's equipment! Another laboratory, the one for aircraft engines, has unique equipment worth hundreds of thousands of rubles and a powerful computer. It has four assigned workers. And one rarely finds students there. Such wealth installed in a separate tekhnikum stands idle, while there is not enough of it in the neighboring one.

The tekhnikums do a poor job of utilizing movies with sound in training, although, in the opinion of many educators, up to 20 percent of the material in tekhnikum subjects could be presented better in precisely this way. One tekhnikum is not capable of organizing a film library and it would be

difficult for the association to carry out this task. General educational schools and associations in the RONO have them in each rayon division.

Can one imagine a secondary school with its own bookkeeping office? There these functions are performed centrally by the rayon public education division. In the tekhnikum there are four people working in the bookkeeping office, two in the personnel division, and two in the UPM. There are 140 tekhnikums in Moscow. This turns out to be a significant number of employees. In an association of tekhnikums it would be simpler to centralize, mechanize and automate these jobs. The tekhnikum has someone in charge of the warehouse (an area of 12 square meters) who frequently does not release any material goods at all throughout an entire workday. Warehouse workers of training and production shops have much more work to do. The training process is conducted by the deputy director for training work in the head of the training section. One can easily see that one service is duplicating the other.

Of course a changeover to associations of tekhnikums requires detailed development of the most varied problems. The goal of this article is to show that one more alternative is possible in the development of the middle unit of the education system. Extensive research under the aegis of the USSR Gosplan would help to determine the path along which to move further. Some of the tekhnikums could be transformed into technical schools for training highly skilled workers, some of them could merge with VUZes with the rights of special departments and reduced training periods, a two-level system of education could be introduced, all graduates of VUZes could be called technicians or.... One thing is clear—industry is waiting impatiently for an effective solution to this crucial problem.

#### FOOTNOTE

1. "Where Are the 'Sergeants of Instruction'?"--SOVETSKAYA ROSSIYA, 26 December 1982.

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#### NEED FOR INSTRUMENT FITTINGS RELATED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 8, Aug 86 pp 112-113

[Article by M. B. Rozenman, engineer (Lvov): "Instrument Fittings Plants Are Needed"]

[Text] The policy of having the plants produce their own instruments, which has been adopted in recent years, seems to me to be economically unjustified because of the high production cost of items in them, the constant shortage of skilled personnel, and the low level of application of normalized and unified parts and components. I see the following as a way out of this situation. The branches should have several large modern plants for instrument fittings which would serve a particular region. In the Ministry of Instrument Making, Automation Equipment and Control Systems it is easy to find such groups of plants, for example, the Western Ukrainian, Caucasian, Baltic and so forth.

In addition to satisfying the needs for instruments and fittings these plants could perform quite new functions. Why, one asks, must designers develop new items every time when it is possible that someone has already developed them and they are already being produced at other plants? At the present time this information is not available. But at a plant for instrument fittings it would be possible to obtain quite specific information: for which parts instruments and fittings have been produced, where they are being used, and how much they cost.

In the stage of the development of the draft or the technical plan the specialist could visit this plant, study the information and gain a very clear idea of which parts could be borrowed completely, as they say, "one for one" and which would be suitable with certain changes.

Of course, a great deal will depend on the purpose of the item, its design peculiarities, the qualifications and imagination of the designer, but the time has come when it would be possible to select for a newly created item up to 70 percent of the parts and components for which there is complete fitting. The designer would be like a builder who uses standard parts for the structure that is being created, and the quality and external appearance of the construction would depend on his taste, erudition and talent. Such an approach would significantly simplify the technological preparation for series

production. To a significant extent it would amount to ordering parts under cooperation at related plants.

Usually under conditions of experimental shops the experimental models of new items are manufactured according to a so-called "roundabout technology"; frequently body parts are "gnawed" out of blocks of iron, stamped parts are ground, cast parts are welded and so forth. But if designers were to borrow parts that were being produced by someone, they could also obtain experimental models through cooperation. And the experimental models would look like they were produced in series in industry.

At a plant where tens of thousands of kinds of stamps and press forms would be produced, the manufacture of permanent parts of instruments and fittings could be organized for mass production with all of the economic and technological advantages inherent in large-series production. Their production costs would be much lower than it is at instrument shops of enterprises.

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#### PAYMENT FOR TRANSPORTATION DISCUSSED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 8, Aug 86 pp 114-116

[Article by V. M. Chugayevskiy and V. P. Lapko (Khabarovsk): "A Coupon for Transportation"]

[Text] Let us imagine a somewhat unusual picture. A truck is moving through the plant's territory. It has stopped at one of the shops. It was met by a shop worker, the loading was organized quickly, the accompanying document has been signed, a note has been made on the trip ticket and the driver has been paid immediately just as a taxi driver would be. But he has been paid not in money, but special coupons which have a certain value. This innovation has made its way into a number of enterprises of the national economy.

During the years of the 10th and 11th Five-Year Plans many enterprises essentially updated and augmented their transportation fleets. But they did not get rid of certain "ailments" — fairly significant unproductive expenditures related to the low level of utilization of transportation in terms of time and cargo capacity. An investigation of individual enterprises revealed a number of essential shortcomings. These included decentralization of the management of transportation and significant—nore than 35 percent—unproductive amounts of idle time of means of transportation and, which is no less important, the lack of interest on the part of the drivers in increasing the productivity of their labor.

Typical and tenacious in all enterprises is a system of distribution of transportation whereby the demands of the subdivision are satisfied in the maximum possible quantities and even more. For example, at one of the enterprises the transportation shop allotted enough transportation for no less than 4 hours even though the client required only 1-2 hours.

With this policy everybody was left satisfied. The client always had a vehicle "at hand" and the transportation workers had all the equipment signed out on order for the entire day, and this is also very convenient to them since the only indicator of the plan for the transportation shop is the number of vehicle hours. And they plan this indicator for themselves. It also suits the drivers who work according to a rate. And so everything is calm at the enterprises, but hundreds of thousands of rubles come out of the state pocket

along with the exhaust gases from transportation that is used on the outside. A more effective system was the organization of intraplant shipment with the drivers being paid with coupons.

This is frequently compared with the work of a taxi. Indeed the principle of operation is analogous: payment for services. The trip that has been made is paid for by giving one coupon to the driver. Its value is determined for each kind of transportation and thus becomes a kind of piece-rate payment for the work of the drivers. The sum of the coupons that are given determines his earnings. If an established sum is reached or surpassed, he is given a bonus. The drivers thus have motivation. One can see this immediately: the driver receives an increment to his monthly wage in an amount of 50-60 rubles, which again is not the "ceiling."

Now the driver is no longer indifferent as to how long the vehicle stands idle. In order to keep to the schedule envisioned for the trip, he himself is prepared to help with the loading and unloading.

The value of the coupons is determined from many variables and depends on the distance of the root, the speed of the transportation with and without the cargo, the time for doing loading and unloading work and, of course, taking the driver's wage rate into account. The value of the coupons which the driver should receive for one day of work should not exceld his daily wage For overfulfilling the output norm by 10 percent the driver is given a bonus in an amount of 40 percent of his monthly earnings (for the fulfillment of the output norm by 100 percent--15 percent, when there are no complaints from the clients--another 5 percent, and for each percentage point of overfulfillment of the output norm another 2 percent is added). The brigade form of labor organization might turn out to be more effective. For if they try, the orders from the shops could be filled with a smaller number of drivers. There is one condition: the value of the coupons allotted to the shops for the month should not exceed the monthly wage fund of the drivers employed in intraplant deliveries of cargoes. Hence the limits for each shop on transportation in vehicle hours. The limits on transportation and the coupons for shipping cargo are developed each month, depending on the number of working days in the month. They are signed by the economist, coordinated with the division for labor and wages and approved by the chief of the transportation shop.

According to the limits, the responsible workers of the shops are issued Their task is to settle accounts with the drivers for coupons on a register. each trip and not to allow an overexpenditure of the month limit. the shops, as with the previously existing policy, order transportation for the next day. But now it is not simply for some unspecified amount of time, but for the performance of a specific number of trips within a specific time The previous practice of keeping the machine "at hand" at all times has been stopped. Another mandatory condition in the new system is mutual responsibility for the utilization of transportation. For example, if the driver has stood idle for more than 10 minutes after he arrives at the shop and has not been given an assignment from the shop dispatcher (has not received or delivered a cargo), the latter gives one coupon to the driver with note on it about the idle time. The transportation shop bears

responsibility for idle time of the vehicle which is the driver's fault. In this case the shop's dispatcher makes a note on the trip ticket. If the shop has released the transportation before the assigned time, the driver is given coupons for 50 percent of the unutilized time that is left; the driver leaves to perform work in another shop or to be at the disposal of the dispatcher of the transportation shop. When the manager of the shop has overspent his coupons as compared to what he is allowed, he writes an explanatory note and sends it to the chief of the transportation shop. The latter coordinates this with the department for labor and wages and with the permission of the deputy manager of the enterprise sends additional coupons, drawing on the next month's limits. If coupons have been saved, the shop's dispatcher has the right to obtain an additional bonus in an amount not exceeding 50 percent of their value.

Enterprises that have introduced this system—the Nikolayev Shipbuilding Plant, for example—have released up to 30 percent of the transportation which previously provided intraplant shipments and increased the labor productivity of the drivers by 35 percent.

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#### COMMENTS MADE ON PRODUCTION CAPACITIES

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 8, Aug 86 pp 117-120

[Article by L. A. Milshteyn, candidate of economic sciences, Institute of Economics of Industry of the UkrSSR Academy of Sciences (Donetsk): "A Couple of Remarks About the Balance of Production Capacities"]

[Text] A good deal is being said and written about the real balance of plans. More precisely, people speak more often about the lack of balance. But let us first take a look at what is generally meant by balance in the existing methods. For balance, as was noted in the round table discussion entitled "Decisive Restructuring Is Needed" (EKO, No 8, 1983) "cannot be reduced to simple arithmetic coordination of proportions." Let us try to take a critical look at one of the most important sections of the system of balance calculations, which lies at the basis of any production plan—the balance of production capacities.

The most widespread source of information concerning production capacities of operating enterprises and associations and their utilization is the form of statistical reporting BM ("balance of production capacities for 198...."). A natural question arises: What is being balanced with what in this case?

If one is to speak of the BM form itself, the left-hand part contains the amount of the production capacity of the enterprise for the preceding year (A), the right-hand side--the capacity at the end of the report year (B), and the center of the form--the number of the amounts (C) that characterize the change in the capacity during the course of the report period. Naturally, there must be the equation B = A +/- C. Thus we have a kind of "law of preservation of capacity"--production capacity does not appear out of nowhere and does not disappear without a trace.

Unfortunately, very frequently it does disappear!... Moreover, is this ratio in general balanced, and is the BM form itself a balance in the literal sense of the word?

The word "balance" comes from the Latin and means literally "having two weight pans," "equalization," which characterizes not so much a condition as a process.

What do we have in our form from balance as a process? In this case what lies in the "pans of weights"? If one is to speak about the balance of production capacities, in one pan of weights there should be the planned volume of product output (P), formed by branch agencies on the basis of the demand for it, and on the other—the production capacities of the enterprise available for this, its capacity (M). Then, as a result of "equalizating" one can reveal what we need—the amount and character of the existing disbalance (D) of these indicators. Since D = T-M, the positive value D shows the deficit of capacity.

Now the capacity (N) necessary for carrying out the planned assignment can be calculated as the sum of the existing capacity in the amount of the disbalance: N = M + / - D.

The process of balancing now is nothing other than an analysis and purposive elimination of disproportions already existing in the report period and possible in the planning period between the amount of demand and the capabilities of production of satisfying it.

The BM form does not give any information about the planned production volume. It is obviously assumed that the planning assignment has been established at the level of the amount of the average annual capacity. It is difficult to agree with such an approach. K. K. Valtuzkh, for example, thinks that "systematic (and even with any duration) utilization of capacities at a level higher than 92-94 percent is practically impossible." Consequently, the planned assignment for the volume of product output should be less than the average annual capacity by 6-8 percent, which will make it possible for the enterprise (branch) to develop and improve the production process continuously and, the main thing, painlessly, that is, without failing to fulfill the planned assignments.

What is the reason for the lack of figures concerning the planned volume of product output in the form "balance of production capacities"? It turns out that this approach has a theoretical basis.

In existing interbranch methodological instructions,  $^2$  the balance of production capacities (reported and plant) means the already familiar ratio B = A + / - C.

To begin with let us take note of the absence of a methodological unity in the very concept of "balance of production capacities." Thus the amount calculated by an analogous formula (only with a breakdown according to months) in other sources is called the average annual capacity, which corresponds more to its essence.

The main shortcoming is still something else. Returning to the described formula let us try to answer the question of whether or not it is correct to call a ratio in which certain constituents characterize the structure of the other constituent a balanced relationship? In this interpretation the search for the balance as such leads to the need to state what, how and in which case with the BM form the indicators which require "equal weighting" are lacking in

the formula and could a relationship of the type of an "equality" not perform the functions inherent in the process of balancing since the equality is the goal and result of the balancing.

People could object that this task was not set for the balance since, according to the BSE: The balance of production capacities is a special balance which reflects a change in capacity depending on the condition and peculiarities of reproduction and the degree of utilization of equipment or other kinds of means of labor that determine the output of products," and from this standpoint everything is in order—the change is quantitatively represented both in the form of the EM and in the formula under discussion.

Small consolation! Practice confirms that attempts to make planning decisions by relying on this kind of balance reports and to expect the construction of a balanced plan are the purest illusions. Planned balances of production capacities are increasingly entering into the practice of national economic planning. Unfortunately, in the branch planning work they use basically report balances of production capacities and plan balances are generally not drawn up, which has a negative effect on the quality of the plans themselves. This situation is a result of shortcomings inherent in the existing methodological developments for the formation of planned balances of production capacities of enterprises and the branch, which do not make distinctions between these and report balances.

What is primarily needed in order to change over to a real system of balance accounts? It would seem that it is necessary to begin with the theory of reproduction. And precisely what the planned balance of production capacities of the enterprise, association and branch should be? Here the floor is turned over first of all to the Gosplan and the USSR Central Statistical Administration.

But certain points are clear even now. The schema for the formation of the planned balance of capacities should be, first and foremost, a unified integrated procedure directed toward coordinating "demand--production capacities--existing resources," although different problems are solved at all levels of management.

Thus in the process of forming planned branch balances of production capacities (and they will have a prevailing nature) one can solve a whole number of the most important problems of production planning which at the present time are practically not considered within the framework of these calculations. These include, first and foremost, improvement of the coordination of the production capacities of the suppliers and consumers of products of the branch, efficient utilization of the possibilities of specialization and cooperation of products, and comprehensive provision of all resources for the output of products.

Further, the method for forming the planned balance of production capacities can obviously be realized only on the basis of combining the balance method and methods of mathematical modeling during the process of optimization calculations.

An indispensable condition for constructing the optimal planned branch balance of production capacities is the possibility of analyzing not one, but several variants of the capacity of the enterprises of the branches. This is explained by the fact that only with this approach is it possible to carry out the basic task of the planned balance of production capacities—the redistribution of planning assignments according to the volume of output of products with the corresponding redistribution of resources among enterprises of the branch.

And the last thing. In order to form an optimal planned balance of production capacities for the branch it is necessary to have a criterion of the optimum which most adequately reflects the content of the goal that has been set—to raise the level of balance of the plan. Obviously the criteria of the optimum will differ under the specific conditions of various branches.

## FOOTNOTES

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- 3. "Tipovaya metodika razrabotki tekhpromfinplana proizvodstvennogo obyedineniya (kombinata), predpriyatiya" [Standard Methods for Developing the Technical, Industrial and Financial Plan of the Production Association (Combine) or Enterprise], Moscow, "Ekonomika", 1979, p 34.
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## LETTERS INQUIRE ABOUT ECONOMICS UNDER SOCIALISM

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 8, Aug 86 pp 121-136

[Article by T. K. Dzokayeva, candidate of economic sciences (Moscow): "Letters About Political Economics"]

[Text] I have letters in front of me. Many letters. Some of them are responses to articles with economic content. Others are letters of confession which are turned over to me for consultation. The authors of the letters are not economists but people of the most diverse professions. Their subject matter is all the same: commodity-monetary relations, thoughts about their nature under socialism. For several years I have been working hard to answer these readers' letters and have begun to regard the increasing flow of them as a phenomenon that is worthy of discussing, analyzing and investigating.

Letters, letters, letters...

What is so attractive in this mail? The diversity, the fireworks of opinions, the sometimes unexpected ideas? The candor of the judgments and the lack of emasculated scienticity in speech to which we have become so accustomed that we consider it the only acceptable thing in professional communication? Yes, all this too. But the main thing is a desire to understand the reasons for the disappearance of various views. After all, are we standing still? Is something causing them? Causes, are a rule, are visible, palpable and explicable. One must say that the problems of commodity and monetary relations are an extremely tough nut to crack even for specialists. They have even divided into different camps. Opposition and alienation are harmful and do not do any good.

And people's personal thoughts about this juxtaposition does not get a sense of any labels: "good guy" or "bad guy." But the judgments are categorical in a way: for and against. And the letters are divided into two bunches. Here are their leitmotivs, "monetary relations"—the first bunch was headed by a letter from students of the philosophy department of MGU. "The main factor that enables enterprises to spend a lengthy amount of time producing products which nobody will ever buy lies in the low level of awareness of the rank-and-file workers and managers of the enterprises and in the disturbance of the mechanism of commodity and monetary relations"—a physicist from Dubna, A. Postnikov, expressed the opinion of the second bunch.

Both authors--both collectively and individually--have arguments. Let us first discuss the first bunch. What so alarms and causes latent and sometimes also overt protest on the part of peopl who have discovered the secrets of economic management against the commercial forms in our economy? Why are the zealots for "purity" of socialism so upset by the words "commodity" and "money."

There are two possible explanations for the n-gative attitude toward the commodity and monetary instruments. One is related to the fact that in these major economic concepts one has always found a concentration of the vices of social systems which have turned into defects of the personality. The other reason for the lack of acceptance is conditioned by the nature of the regulation of social processes using these instruments.

#### Bad Memories of the Past

"Commodity and monetary relations impede man's education"—this is the root of many people's lack of acceptance of money under socialism. This categorical opinion goes back into the history of the society, into the systems of distribution that existed in the past. The people's well-being was linked to those portions which were allotted to them from the social product, which was delivered in monetary form. Various social systems, as we know, create unequal conditions for distribution. What lies at their basis? The answer to this would remove many accusations and curses from monetary instruments.

Under certain social conditions the concentration of commodities and money in individual hands can exert a disintegrating effect: vices begin to appear, value orientations are confused, and laziness, idleness and so forth develop. People are convinced that the history of money is the focal point of evil and vice. They are widely read: Zola, Balzac, Hugo, Pushkin, Dostoyevskiy—who among the greats is not convinced of this?

Yet people encounter speculation, bribe taking, theft and unearned incomes because of their knowledge (or ignorance), they are inclined to ascribe these to commodity and monetary relations. There are many letters containing variants of abolishing money or eliminating it from our reality. They suggest replacing it with receipts, work money and so forth, causing political economists to recall the excellent intentions and bitter experience of the utopians. Technicians look for the panacea in technology. They advance ideas of computerization of exchange relations and so forth.

But how does one explain that money cannot be used to abolish money? One can start a war against it but still one cannot fight with the mythical Hydra: as soon as you cut off one head another appears before you. Are we really not convinced of this from practice? It sometimes happens that the balance of commodities on the market is disturbed, money loses its value and ceases to "work" as it should. And then the market generates its own "currency." I am replacing Tsvetayeva with four Pasternaks: for two Mandelshtams! For three Voznesenskiys!... Tsvetayeva is "currency." Jeans are "currency." I am exchanging for boots, for pillowcases, for a leather jacket. A shortage item for a shortage item. Money does not enter in....

But time passes. The ills smooth out and the shortage disappears. What is transitory departs. What is permanent remains. The economic balance is restored. There are plenty of pillowcases on the shelves of the stores. Weather jackets are taken on consignment. Money has recovered from the blows and has its full value again. In a word, the path of abolishing money is unacceptable. And in economic works such ideas can only detract from the search for the necessary directions.

But money is a secondary phenomenon in the economy. The primary one is the commodity. It is precisely its nature that explains the processes of regulating the economy. These find their expression only in the various functions of money. It is axiomatic that material production is the basis of the society's existence as it is that production is social in nature. And not only in the sense that people work together or are joined by the division of labor. The bearer of social relations is the product of material production itself, even in its unitary form, that is, the commodity.

There is an essential difference between the product created directly for consumption and the commodity form of the product. The former, if it does not pass the test of public demand, is left with its producer. It creates a limited and particular interest. No "field" of direct and reverse ties appears around it. But as soon as the product begins to be exchanged for others and enters into a series with them, it is transformed into a commodity. And then a product which was previously closed within itself reveals its more complicated social essence.

A commodity is capable not only of satisfying man's need, it bears information about whether the expended labor is necessary to the society or not. And what is more important for social development? After all, labor is the basis of the economy. There is no greater harm than to lose even a particle of labor. It is precisely in the splitting up and the dual nature of the commodity, in its return to the market and to other commodities that one finds the source of the movement and development of commodity production. The economy's movement cannot be halted. But in the presocialist epoch the movement was not regularly progressive. Sometimes it came to a standstill and sometimes it was in conflict. And then it was necessary to find a way out, a resolution of the contradictions, in order to continue on the path. The contradiction was resolved by the commodity and monetary mechanism which made it possible to realize and develop human interests.

But this is a blind resolver of contradictions, a random regulator. People produce products, but how many are necessary and what is the measure of social demand? For they are what regulate production in the final analysis. Everything beyond what is necessary is useless and destructive. But nobody can say: how much? In the random market mechanism only one method is in operation—trial and error. Sometimes the "trial" is successful. But it is necessary to pay for mistakes. And a good deal. Sometimes the ground slips out from under the legs of the producers. And then defeat and failure are inevitable.

Value categories reduce private and public labor to a common denominator, compare them, sometimes forcefully, to one another, and subordinate local evaluations to global ones. In a word, these are compulsory and rigid regulators when they operate unbridled in their pure form. And to let these regulators remain under socialism? But is it not possible to neutralize the negative consequences of the effect of value regulators and retain their useful properties, leaving them with the role of measurements of public labor? Fantasy? An attempt to grow roses from thorns?

For socialism these tasks are no longer consigned to the realm of social alchemy. For distribution of public labor socialism introduces a new principle—the equivalent to invested labor. Excluding nonlabor income is a decisive method of transforming the destructive influence of commodity and monetary relation on the individual. As for control and regulation of social ties, principally new possibilities open up here as well.

Commodity? Not a Commodity....

If the authors of the first bunch of letters had an extremely negative attitude toward commodity-monetary levers, juxtaposing them to naturalization of economic relations, the others, conversely, see a panacea only in commodity categories. But they are also too categorical. And because they are so categorical the real causes for the mistakes in managing the economy are concealed.

Socialism came to replace capitalism as a social system that is of a higher level of organization. The system is based on public ownership of the means of production and deliberate regulation of production. It brings public and local evaluations of labor closer together. Socialism has been historically prepared for by processes of collectivization of production. Separated into innumerable units, production moved toward recombination and collectivization, thus creating possibilities for conscious regulation of social ties. Even under capitalism, especially under the conditions of state-monopolistic development, there is a tendency toward conscious regulation. It is precisely here, in large-scale production, that commodity regulators gradually begin to lose their positions.

Socialism is large-scale production. Although not in the directly linear sense that the enterprise inevitably assumes immense sizes. It is large-scale because it is essentially based on state, public ownership. And then the system of production regulators changes radically. The gazes of economists are turned not to the dual nature of the commodity as a condition for regulation of production but as a condition for public awareness.

The relations between ownership and product are undergoing principal changes. In fact, the owner of the lion's share of the social product—the means of production—is the society. And only the second part—objects of consumption—proceed as before along channels of commodity and monetary circulation. In V. I. Lenin's definition, the means of production, "the product of the socialist factory...is not a commodity in the political and economic sense, in any case it is not only a commodity, it is no longer a commodity, it ceases to be a commodity." The commodity, as we have known it for so long, needs to be

reinterpreted under today's conditions. There is a need to open it up again and remove from it the husk and the layers of past formations.

It is important to make clear what is left of the commodity in the sphere of production. Does it retain its former splitting, its dual nature resulting from the unity of concrete and abstract labor? Here, perhaps, is the most important and most difficult point to understand. Many have perceived the social nature of labor under socialism too simplistically, without conflict, as a complete triumph of sometimes abstract and sometimes concrete labor. In any case, the differences between them have been erased. "Is there such a thing as socially necessary time under socialism? No, this does not exist. Under socialism the difference between actual expenditures and socially necessary expenditures disappears. Now all expenditures are directly social"—writes A. Syasin (Moscow).

Erroneous ideas have sprung up not only in the nonprofessional awareness. They have been reflected in processes of managing the economy. Ignoring the dual nature of labor reduces the importance of labor to concrete actual expenditures. Hence the ill-fated expenditure method in determining value and prices. Hence also the shortcomings in weighing the differences between complicated and simple labor when paying for it and in the system of distribution. And there is the inevitable equalizing, the poor motivation to increase skills and professional mastery, and the devaluation of engineering labor.

And yet in the awareness of many nonprofessionals there arise interesting questions about the role of abstract labor. "If a magician were to come and by some miracle we were to begin to receive rubles in proportion to the quantity of expended abstract labor, can one assume that everything would work out and our labor productivity would become higher than in Japan?"--asks the student B. Kalinin from Gorkiy. There lives a hope in abstract labor as a powerful stimulus for the development of production and the reduction of expenditures. For there is a change not only in the dual nature of labor as such, but the method of establishing it. The random is replaced by the deliberate, the regulated. Thus there appears a new system of regulators that are unified by a single concept--planning. Its essence amounts to accounting for the dual nature of labor, to the establishment of proportionality in the economy on this as is, and to constant conscious orientation toward the correlating role of average socially necessary expenditures per unit of product--instead of the orientation toward concrete, actual expenditures of labor which exists in practice.

And then—there is no contradiction between planning and the mechanism of value and prices. They also become objects of deliberate utilization by people. Thus in the hands of physicists lightning is tamed. For planners the value categories are the same kind of threatening things which can and should be utilized for creative purposes.

"In the work for restructuring the economy and the economic mechanism," it said in the Political Report of the CPSU Central Committee to the 27th Party Congress, "it is more important than ever before to rely on science." In this connection they gave a clear definition of commodity-monetary relations: "It

is time also to overcome the prejudice regarding commodity-monetary relations and their underestimation in the practice of planned guidance of the economy. Denying the importance of their active influence on increasing the interest of people and the effectiveness of production weakens cost accounting and causes other undesirable consequences. And, conversely, healthy functioning of commodity and monetary relations on a socialist basis is capable of creating a situation and conditions for management whereby its results depend completely on the quality of the work of the collective and on the ability and the initiative of the managers."

# Disputes About Control Levers

The central issue is the system of national economic ties. The authors of the first bunch of letters think that any manifestation and utilization of commodity and monetary levers in planning is a concession to random forces that go out of the control of this society. They do not accept the conciliatory formula of the economists: "Planning and commodity-monetary relations." Instead of the conjunction "and" they categorically insert "or." Many consider allowing commodity-monetary instruments along with planning to be the result of a lack of confidence in the power of planning and deliberate formation of national economic ties.

Objecting to such ideas, V. Karpachev from Baku correctly writes: "Apparently economists perceive the vices of planning and management cost by temporary shortcomings of this mechanism as built-in vices which are inherent in the very system of centralized planning and management. One cannot mix together shortcomings generated by the imperfect organization of the structure of planning agencies and control agencies and the activity of incompetent workers who have no initiative, and positive qualities of the system of centralized planning and control which are potential and not yet fully revealed."

The authors of many of the letters refine the concept of centralized planning. They do not reduce it to directives coming from a unified center. They do not understand centralized planning in a such a way, say, that they dig a well in Siberia and go to Moscow to solve all their problems. People reasonably ask: "Why cannot these problems be solved by local agencies which are also planning agencies? They suggest constructing an entire system of planning in keeping with the principle of the hierarchical structure. "Apparently in planning and management it is necessary to clearly divide and delimit the levels of claims of the structures and to staff economic agencies with competent people who The people in the central planning and management will take the initiative. agencies who take it into their heads to plan every screw should be retired for making mountains out of molehills. Then the spades and screws and nails will be planned not from the center, but at the corresponding levels of the enterprises, regions, branches and the national economy as a whole, and all needs will be taken into account and promptly satisfied "-- continues the preceding author.

It is typical to approach the national economy as a unified whole where everything is necessary (both screws and nails), where "the law of scientific planning provides for production activity with the precision of a clock mechanism" (M. Breyterman, Cherkassy). All this is true. But just a bit

further and the truth is confused. The authors of the first bunch of letters suggest organizing ties only through the product directly, in its physical form. They give examples of considerable divergences in the evaluations of indicators of the monetary and physical categories. For instance, an industrial enterprise accounts for and reports an increase in labor productivity calculated in monetary amounts, but actually production is not improving.

"There will be violations in planning as long as the prevailing method of planning in the country is in money, which does not reflect the actual state of affairs"—writes V. Pravdin from Leningrad. He is seconded by I. Skaybela from Gomel: "Many kinds of products are planned in money. The more expensive the product, the more advantageous it is and the easier it is to cope with the plan. Therefore more and more costly work is done, costly materials and batching items are used, even though there is no need for them."

The authors of many of the letters also use planning in monetary measurements to explain the inclination of managers to eyewashing in the practice of exaggerating figures. They consider it a panacea to change over to planning in physical measurements: "You give a concrete product to the consumer and you receive in the age everything necessary for normal functioning of the production unit. If give a 'fake' figure and you receive nothing. Thus the rug is pulled out from under the eyewashers. They no longer have the possibility of engaging in numerical manipulations and they will be forced to arrange exemplary accounting for all material values at their disposal"—writes A. Zhuribeda from Vyshgorod, having in mind relations among enterprises concerning exchange of means of production when instead of contractual commitments the enterprises keep accounts in terms of products sold.

Many authors exaggerate the role of commodity and monetary categories, especially when they encounter manifestations of poor management which could be avoided with the help of commodity regulators or feedback signals. "Specialists in automation should be well aware of the systems of the behavior of complex systems in the event of the cutting off of feedback. Hence the 'dramatization' which economists might consider excessive"--writes a specialist in cybernetics.

The author of the letter is absolutely right. The impulses for feedback in the economy move at impermissibly slow rates. Many probably recall how in the 1960's, on the threshold of the economic reform, the talk of the town was the overproduction of sewing machines. An immense quantity of the unmarketable commodity accumulated in warehouses throughout the country. And then their output was curtailed and only one specialized enterprise was left. Time passed. The commodity supplies were dispersed and the capacities of one enterprise were not able to cover the demand. A critical shortage arose, which remains even today. Similar cases also form the attitude toward commodity and monetary categories and give rise to skepticism regarding the possibility of conscious control.

In the beginning, when sorting the letters I spoke about dividing them up according to the principle of "for" and "against." But when clarifying the reasons for various views it no longer seems correct to make such a

juxtaposition. When one begins to clarify what the juxtaposition of views pertains to and what the people want, one comes to the conclusion that all want the same thing. And then their views merge.

Again About the Reasons for Rejection

Where does this inclination to naturalize economic relations come from? It is not difficult to see at its basis a quite rational, correct idea—the need for an interconnected, proportionally developing national economic mechanism. Here everything is important and necessary—right down to the last screw. Hence the increased interest in the consumer value and the emphasis on the physical aspect of the product. Balance of the national economic organism is achieved with a high degree of collectivization of labor.

In the comparison of the results of the operation of enterprises there are differences in expenditures for various economic reasons: technical supply, organization, skill of management, discipline and so forth. This means that the problem of weighing expenditures on the scale of socially necessary labor does not disappear. Moreover, this weighing becomes a controlled process. To see the bottlenecks in production and straighten them out on time is a matter for managers. And under the condition that the prices of products for which the enterprises enter into economic relations with one another correspond to socially necessary expenditures, the differences in the material positions of the collectives of the enterprises will provide incentive for reducing the actual outlays. And all this should be controlled and take place within a planned framework and not outside it. But in the views of the people the idea of introducing completely physical measures for economic ties has become absolute in nature because in practice value measurements have turned out to be inadequate, as though they were broken off.

Regardless of the system of regulation, in and of themselves value, price, money, profit and profitability are categories of final results. But if the profit is calculated for products that are not yet sold and delivered to the consumer, is it really possible to call this a final measurement? No! Its effect is broken off in mid-stream.

"Broken-off" ties objectively generate irresponsibility of managers, neglect for the quality of the items and indifference about the amount of production outlays.

Moreover, another contradiction arises. The actually unrealized profit (calculated for unsold products) increases the quantity of money in circulation because of the need to pay for the labor of workers who have produced these products. The growing monetary masses are not covered materially. The incomplete effect of value instruments is also shown by phenomena when enterprises with identical levels of technical supply, productivity and so forth in the end because of the system of distribution are equated with backward enterprises.

Thus in spite of the apparent paradox one must say that production suffers today not from the affect of commodity and monetary levers, but from their weakness and from their poor adjustment. Frequently what is called commodity

and monetary levers in fact hardly have the right to such a title. Profit obtained before the products are delivered to the consumers, value calculated by the expenditure method, a price that follows from such "value" and so forth. And yet the formal categories have literally flooded economic literature. It begins to seem that it is necessary to fight against commodity and monetary instruments, that they are dangerous for planning. Herein lies much of the explanation for the lack of acceptance of commodity and monetary categories by people who are frightened for the destiny of the economy.

In the end one comes to the conclusion that were it not for the deviations generated because of the weakening of the functions of centralized planning and management and the lack of understanding of the essence of commodity and monetary levers as instruments of final evaluations, were it not for violations of the law of distribution according to labor, the positions which now seem opposed would come closer together. After all, the authors of the letters are concerned essentially about one and the same thing.

"Man's psyche is such that he cannot see how the good created by his own hands perishes, he is disturbed, his awareness rails against such an antinatural process, and he searches for a way out. Irresponsibility is to blame for the fact that the work of planning agencies has been given a low rating by the population. Unjustified shortages have been created, the needs of the population have not always been clarified, thousands of units of commodities have not been purchased in the stores because they have not been needed, and then they have been written off...—writes a military serviceman, A. Drobotov.

"The Economy Needs Its Own Kurchatovs and Korolevs"

The authors of letters in both bunches address economists and knock on the doors of economic science. But after knocking they are sometimes disenchanted. "When in my research I have come up against political economic issues the textbooks, articles, monographs and dictionaries which I have read have not given any answers to these questions of life. I have been forced to look for them myself. I have looked for them in research on ancient history, and in normative documents on labor, land, civil and kolkhoz law, which practically reflect the existing production relations. But above all in life that surrounds me"—writes the worker V. Glyazer from Sayanogorsk.

After all it is understandable that those who "look for themselves" have all kinds of difficulties waiting for them, the overestimation of certain factors and circumstances and the underestimation of others, the mixing of perspectives in evaluating the phenomena that are observed. And this makes it difficult to do a fine tuning in evaluating the ideas that have been gleaned.

In many letters one hears bitter reproaches addressed at economists and most of all political economists for their slowness and for the apparent and sometimes real fruitlessness of debates and discussions, for their separation from reality, and for their passivity in improving the economic mechanism. "Soviet atomic and missile experts have completed a feat and they have provided our people with a reliable defense from nuclear missile sabotage. But in order to win in world competition with more developed countries we must

set for our economists a task whose solution must also be a feat. Our economic science needs its own Kurchatovs and Korolevs"--writes A. Postnikov.

Of course it is necessary to gain new knowledge. But there are many truths which have already been gleaned in political economics—by Marx and Lenin. In disputes everyone will say that a commodity cannot be a product that is not delivered to the consumer, that a product is sold and purchased depending not on the actual expenditures of labor on its manufacture (otherwise loafers and unskilled people would flourish) but in keeping with socially necessary expenditures. They also incite production and do not allow those who are in front to be complacent or those who are lagging behind to be satisfied. The former are strengthened even more economically and the latter are fighting for their existence. Everything that is in excess of socially necessary expenditures produces a negative effect in the economy and everything that is below produces a positive one.

Of course there are concrete economic sciences, dozens of them. They say that they also engage in the practice of management. But if, say, in concrete sciences they do not pay attention to one or another of the aforementioned general economic points (the point about the dual nature of labor, without which it is impossible to organize management of production correctly), can this be a matter of indifference to political economics? Is it right to remain enclosed in the sphere of abstractions when indisputable points already discovered by science are not being realized? One would think that it is not, that there cannot be a law if it has as its goal to cause the tree of life to remain green forever. The authors of the letters say that they cannot understand the inclination of political economics to such self-isolation. They compare it with their professional activity. They ask rhetorical questions. Is it really possible, for example, to imagine spice scientists who do not know and are not interested in what happens to their ideas in practice. And people are constantly turning to economists: "It is not simple to figure out all of the intricacies of life, but nor are there any unintelligible problems which they are incapable of solving. They are always in the power of people who study them conscientiously, people who are not prejudiced" (V. Seregin, Moscow).

The letters cause us to think about many problems. About whether traditional developments, textbooks and aids or even discussions are capable of satisfying the public need to understand even one problem—commodity-monetary relations? Have conditions been created for achieving the necessary educational effect? Should we not, for the sake of combining theory and practice, change the direction of the discussions, disputes and processes of training and the subject matter of scientific research in the direction of crucial problems related to the development of public production and public awareness.

Under modern conditions the time has come to remove the question marks. And to borrow the feature that many of the letters had in common—the categorical nature of the statements. But this time it is justified. On behalf of social progress it is necessary to unite economic theory with the practice of management, to speak with people in living human languages, and to transform political economics into a "necessity" in restructuring the economic mechanism and understanding the essence of social relations.

### FOOTNOTES

 Lenin, V. I., "Poln. Sobr. Soch." [Complete Collected Works], Vol 33, p 276.

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#### FILMS USED IN ECONOMIC EDUCATION

Novesibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 8, Aug 86 pp 137-141

[Article by S. M. Balanovskiy, chief of the Laboratory of Sociology and Psychology of the Omsk Polytechnical Institute: "From Antiheroes to Heroes"]

[Text] The last film by scriptwriter V. Chernykh, "The Understudy Begins To Act," interprets problems of selection, training and placement of management personnel of the enterprise. Therefore I would call this film sociological.

The creators of the film based the plot on the well-known Omsk Experiment at the Elektrotochpribor Plant where they tried out young specialists from the "reserve for promotion"—from foremen to director of the association. It turned out to be quite a spectacle; the film is interesting to watch. "Art is not a mirror but a magnifying glass" and therefore people in the arts have the right to invent, conjecture and transform events and phenomena of reality according to their creative imagination. They have the right to single out from our daily life that which is typical, new and in the process of being born. Herein lies the great calling of art. But even with all this creative workers should not change the sense of truth and verity.

And so, according to the film, the managers of the shops and the enterprise leave the plant for a month and turn it over to young specialists who are candidates of the reserve (in the film they are called understudies of the managers). The picture of the selection of the candidates unfolds before us. Stop! Are they really determined carelessly, even with the participation of the peremptory sociologist larisa Ivanovna who entertains no doubts about anything? Let us recall, colleagues! The explosion in turnover in some shop, the situations of conflict, the social needs of the collective that have not been taken into account—and you torment yourself looking for an answer in specialized literature, in meetings with colleagues, and again and again you delve into your reports on sociological research. And all because you feel the responsibility and a sense of participation in what is being done in the collective.

In actual practice the list of the reserve is prepared in good time and it is carefully worked out at all levels of management of the enterprise. And when it has to do with top positions it is coordinated and approved by the

personnel administration of the ministry. Therefore the "vignettes" of understudy candidates for the position of director in the film seem funny and naive.

But here a candidate is selected by the method of winking or nodding the head in the direction of the director. In what way is he "better" than the other candidates, what is his selection of moral-political and business qualities.... He is in no way better—the film convinces us of this. Moreover: he is shy and retiring and is not very well aware of the "rules of internal order"—and he might even fall asleep during work time. From the beginning until the end of the film they make a fool of the intelligent and respectable Kostin several times. The deceived viewer perks up: "Ah—hah, see, our hero is transformed from a Cinderella engineer into the leader of a large collective." And his intuition does not let him down!"

On the screen there is nothing remarkable or inert in the work and even in love the anti-hero is transformed into the hero-leader of a large collective. And, strange as it may be, we believe the filmmakers and we believe in the miraculous transformations of Kostin (B. Plotnikov). Convincingly and logically, from episode to episode, it is shown that confidence and responsibility disclose the hero and give him new forces. As the film's heroine, television director Olga (N. Danilova) correctly noted: "Previously you were an ordinary chap from an ordinary family. But now you are a personality!"

The effectiveness of the activity of the manager is evaluated according to how optimal his decisions are and according to his ability to organize the collective for implementing them. To implement a decision in an optimal way means to achieve the goal with the least economic and moral losses. Without rush work and overtime work, without work on days off, without unjustified overpayments, without undermining socialist enterprisingness, by actions that violate the law, and without frightening or abusing the collective or the individual worker. There should be a correspondence between the noble goals of the socialist economy and the noble methods of reaching them.

Leaving an understudy in his place, the real director Tsybin (M. Gluzskiy)—who is undoubtedly progressive since he agreed to the experiment of trying out the young people—turns it over to Kostin with a shudder: "Just do not touch the production that has been arranged!" If you must play manager, go ahead, but do not lose the game.

But the hero, fortunately, did not turn out to be so "prudent." The galvanizing shop was holding up the plant's operation: the outdated equipment, the crowded conditions, the stuffiness and, as a consequence, the turnover. And here the understudy for the chief of the galvanizing shop Seregin declares: "It has long been time to change the ventilation, the pigeons have already probably built nests in it. One cannot take a deep breath in the shop!" Kostin supports Seregin's suggestion to halt the shop for reconstruction. After all, they have been discussing the need for this for 5 years already. But the progressive Tsybin did not decide to do this.... It is not difficult to imagine how they patched up the holes of the "bottleneck" of production with a shortage of fleeing workers: work on days off,

"overlapping" shifts, emergency work, overtime work, and there was only one compensation for the workers for these difficult working conditions—inflated wages. But even these did not hold the people there.

Forgetting that he was "king for a day" the understudy rebelled against the "pushers" and demanded that they make the guilty parties pay for the losses caused to the enterprise because of the negligence and incompetence of the worker in the supply department. Moreover, the commodity expert was to be relieved of his position. And Kostin's position was in keeping with the principles: "Should someone who does nothing be considered a worker?"

Naturally, the bold and significant decisions and actions of the understudy elicit sympathy from the viewers. The more so since the alarmed Tsybin demands that the experiment be stopped (the newcomer has gone too far), but Kostin, who believes in himself, firmly asserts that the time period for the experiment according to the ministry's order has not expired and he follows the matter through to the end.... Good!

Look around you! What a shortage there sometimes is of firmness and persistence in the face of the higher managers, and these are not young, beginning people, but experienced career production commanders! And are you yourself always sufficiently true to principle when under pressure from circumstances or your immediate superior? In our rapidly moving age experience is not always a good thing; sometimes it is tantamount to time-serving and stagnation, a search not for solutions, but for loopholes in order to solve production problems. The mine of this kind of administrative "information" in the film is the outstanding director of the neighboring enterprise who is quite willing to teach the understudy, the more so since there is the chance of making him his son-in-law.

And so the film was cinematographically successful because of the crucial nature of the subject matter, the sharpness of the plot, and the struggle of passions having to do both with production and, we must admit, love. At the same time the film was instructive both from a sociological and a managerial viewpoint. How, precisely?

A passive and indifferent worker can be made active and effective if he is entrusted with difficult and responsible work (naturally, if he has the gifts for this).

The film shows: one cannot live according to the principle of "we--the little people," close one's eyes to breakdowns and bottlenecks in production, and put up with poor working conditions, disorganization in production, poor labor discipline and personnel turnover. It is necessary to search for means and methods either of eliminating the shortcomings or easing their unfavorable influence, as in the case with the galvanizing shop.

The experience in preparing the reserves for advancement at the enterprise is progressive. Were it not for this the manager's departure from the post he held would involve panic in the system of management since a successor would not be trained.

There does not seem to be any danger that having seen the film the management of the enterprises will begin immediately to conduct weeks or months for young workers without preparing for the serious managerial process through thoughtful work with the reserve for advancement. The fact is that understudy work, as a rule, is the final stage in the training of future managers.

At Omsk enterprises, for example, the following system of preparing the reserve has taken form, and it was developed and has been tested more than once by sociologists of the Omsk branch of the Center for Scientific Organization of Labor of the USSR Ministry of the Petrochemical Industry. 1 First the candidates are selected and there is an expert evaluation of their moral-political and business qualities as well as their level of competence. Then there is collective training and management methods, temporary duty in the recommended position for a month under the observation of an experienced manager, individual training according to the results of the expert evaluation and the probation period, and the final selection of candidates for the All this takes about 9 months (the candidates are trained without reserve. leave from production). It is indicative that up to 30 percent of the candidates who have started do not finish-this means that they do not meet the requirements placed on the modern production commander. Because of this verification there are no mistakes: these candidates are called up from the reserve for advancement.

Let us note that one of the crucial problems of management was the basis of the film plot and, in turn, this causes us to reinterpret this phenomenon in management practice. The circle has closed. Is this not the great purpose and mystery of art?

#### FOOTNOTE

1. Balanovskiy, S. M., "Training Managers of Enterprises," SCISTALISTICHESKIY TRUD, No 3, 1979, p 73. Balanovskiy, S. M., "Experience in Preparing, Training and Conducting Probationary Periods for Management Personnel at the Enterprise" in the Collection "Sotsialno-psikhologicheskiye i sotsiologicheskiye problemy proizvodstva" [Sociopsychological and Sociological Problems of Production"], ed. by B. P. Kutyrev, Omsk, 1978, 84 pp.

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#### CZECHS USE INDUSTRIAL TECHNOLOGY IN AGRICULTURE

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 8, Aug 86 pp 142-168

[Article by Academician A. G. Aganbegyan: "The Czech Cooperative Slushoviche —Leader of Industrial Technologies in Agriculture"]

[Text] During a business trip to Czechoslovakia I had the good fortune to learn about the experience of a remarkable labor collective—the Slushoviche Cooperative which is located 300 kilometers east of Prague. This collective was formed in 1975 when cooperatives were being consolidated in Czechoslovakia. In terms of the amount of land and the number of workers, this is one of the large, but not the largest cooperatives in the country. It has 5,500 hectares of agricultural land, including 3,700 hectares of plowed land. There are 3,100 permanent workers in the cooperative. Additionally, it enlists pensioners, home workers and other people who work part-time and also people who combine this with work at other enterprises and organizations. The overall total number of people working the cooperative, translated into full-time employees, is 4,200.

When in a conversation with the chairman of the cooperative, the engineer Frantishek Shuba and the secretary of the party committee, Pavel Smolik, I heard about the results of the cooperative's activity and the volume of products produced, I did not believe it and asked several times if the figures were really that great. Henceforth I shall give the indicators in Krona. It is easy to convert: according to the exchange rate 10 korunas = 1 ruble. The volumes of commodities and services produced in the cooperative were: 620 million korunas, 1981—920 million, 1982—1,260 million, 1983—1,760 million, 1984—2,060 million korunas and in 1985 the volume of economic activity will exceed 3 billion korunas. For comparison let us point out that the richest of all the rest of the cooperatives in Czechoslovakia has a sales volume that is many times less--about 200 million korunas. And so few more than 4,000 workers produce 3 billion korunas' worth of products, which means that labor productivity (including people employed part-time) amounts to 620,000 korunas per worker, which is 5 times the average level in Czechoslovakia and twice the level of labor productivity in the United States. We have before us an example of very effective management, which is what made it so attractive to EKO.

I wish to draw attention to the rates of increase in production, which are annually 30-40 percent and are achieve, almost exclusively through increasing labor productivity.

What is the secret of such, frankly, phenomenal results? The major factor is their reliance on scientific and technical progress and revolutionary changes in technology and technical equipment. I shall begin with agricultural production as such, with what I saw with my own eyes.

The region in which the cooperative works is a relatively poor region of Czechoslovakia and in the past they harvested 8-11 quintals of grain crops per hectare here, while in the richer Fastern regions of the country the yield reached 40 quintals. The cooperative now has 1,500 hectares planted in grain crops, including 600 hectares of corn for grain, and another 900 hectares of corn are raised for silage. They have 400 hectares planted in pulse crops, 300 hectares in vegetables, 3.5 hectares of hothouses, and so forth. One is impressed first and foremost by the average figures for productivity of grain crops—67 quintals per hectare, that is, 7 times more than in the recent past. In the rich and more fruitful regions of the country the yield has also increased from 40 to 50 quintals. The cultivation of grain crops here is completely mechanized and requires minimal labor expenditures. But the cooperative does not have additional agricultural land to expand the planted areas. Therefore it has extensively developed reimbursible introduction of new technology for cultivating grain crops on other farms, thus coreading its activity to about 30,000 more hectares of planted area. This is how it looks.

In keeping with agreements, the Slushoviche Cooperative is introducing modern comprehensive instrument systems for cultivating corn in other cooperatives. To do this, in its laboratories it conducts analysis of the soil and establishes precise doses of fertilizer which must be applied in order to obtain maximum yields. The cooperative produces these fertilizers itself in a small, fully automated plant which is run by one worker at the control panel during each shift.

Naturally, I visited this plant. It receives its initial raw material in the form of phosphoric acid and other components and it prepares complex fertilizers in liquid form. In the opinion of the managers of the cooperative, the production of liquid complex fertilizers has great advantages over solid ones: it is easier to observe the requirements for the protection of nature. Special trucks drive up to the plant and the driver himself fills them with the necessary liquid fertilizers. Depending on the composition of the soil to which they are to be applied, one can easily vary the ratio, for example, of phosphorus and nitrogen in the complex fertilizer.

This plant was constructed in 1976 and it cost the cooperative 10 million korunas. They constructed it themselves, on the basis of domestic equipment, and certain units they manufactured themselves or adapted existing equipment. But the problem consists not only in manufacturing and transporting liquid fertilizers, but also in creating machines for applying them to the soil. The machines that are being produced, in the opinion of specialists of the cooperative, do not spray the fertilizers economically enough since part of them immediately evaporate. Therefore the cooperative produces its own

machines which apply fertilizers directly to the soil and roll it. In a number of cases it is more effective to spray these fertilizers on the leaves, but special machines are used for this.

From what has been said it is clear (and subsequently this will be even clearer) that the cooperative includes a developed natural economy. This was a necessary step. In Slushoviche they have not only a factory for liquid fertilizers, but also a small machine building plant which produces agricultural implements which industrial technology misses. In particular, for industrial cultivation of corn it is very important to have a seeder for precision planting which provides for spreading 76,000 kernels per hectare. The ordinary seeder, as we know, does not guarantee this precision and therefore one loses 10 and more quintals of crop (per hectare). cooperative has arranged the production of such precision seeders (they are not produced at other plants of Czechoslovakia) under a license acquired from the West German firm Becker. In all of its machine building facilities the cooperative produces 59 types of machines, 47 of which have been copied from the best world models and 10 of which are a product of their own development. I asked where they got the metal from. It turned out that in Czechoslovakia the cooperatives can now freely purchase many kinds of rolled metal and the cooperative takes advantage of this.

It is impossible to obtain a large yield of grain or, incidentally, of other crops either if one does not apply the necessary means of chemical plant protection. For some of the fertilizers do not fall on the crop plants and cause additional growth of weeds, which reduces the productivity. Moreover, part of the crop dies because of pests. Many necessary kinds of chemical plant protection are not produced and not sold in Czechoslovakia. Therefore the cooperative has created a biochemical center where an experimental production manufactures the necessary means of plant protection. Naturally, this required also producing machines for dusting the planted areas with means of chemical plant protection.

One could say even more but what has been said already demonstrates the scientific agroindustrial approach the cooperative takes to producing agricultural products.

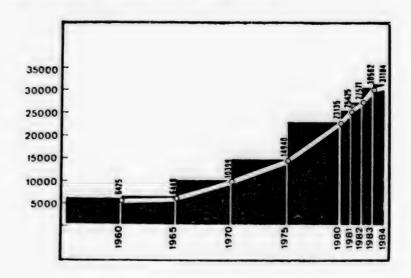
Now let us return to the idea of reimbursible aid. The conditions of the agreement with other cooperatives are interesting in and of themselves. If as a result of the help which Slushoviche offers as a complex the client's yield of corn increases by 20 percent or less the cooperative-contractor does not require any payment and does everything at its own expense. If the yield increases by more than 20 percent, half of the increase in the yield is paid to the contractor. For example, if some cooperative has an initial corn yield in the amount of 40 quintals of corn grain, increasing the yield to 48 quintals does not make it necessary to pay for the fertilizers, the use of the machines, the means of plant protection or the labor of Slushoviche members. But if the yield is 66 quintals (and the average yield increases approximately to this figure), then 13 quintals (half of the increase in the yield--from 26 quintals) goes to pay the contractor.

Managers of the Slushoviche Cooperative consider this path to spreading the comprehensive industrial system of cultivating agricultural crops to be the main one for overcoming the low level of many farms in providing for a general upsurge.

The cooperative also cultivates fruits and vegetables, including in large hothouse facilities. Here it has organized a unified process, from production to delivery to the consumer: it processes fruits and vegetables and prepares them for sale (in particular, it packages them); it has used its own money to construct four fruit and vegetable stores, including a large four-story specialized trade center in Gotvaldov, where they not only sell fruits and vegetables from the cooperative, but also run a restaurant with a predominance of vegetable dishes and provide advice for housewives regarding this issue. The cooperative is always looking for new areas for applying its capabilities. In recent years in Czechoslovakia, as in other socialist countries, there has been extensive development of gardening and orchard raising, and many plots are allotted not only to rural residents, but also to city dwellers. cooperative immediately organized its own subdivision under the name "Mikro-Agro" where it has developed trade in small doses of fertilizer which are already prepared for being applied to small plots; it trades in agricultural supplies and offers advice and services to owners of small plots. purpose, in particular, the cooperative keeps horses with which, in a number of cases, the citizens can plow small sections more effectively than they can, say, with a modern tractor.

The work in animal husbandry has been arranged in a very interesting way. The cooperative has 1,600 milk cows and a total of 12,000 head of cattle. It also has 'a hog farm and a poultry farm. The cooperative produces 6,000 tons of meat each year. The average milk yields per cow in the cooperative amount to 5,451 kilograms. Of the 100 best cows in Czechoslovakia 32 are from this cooperative. There are farms which keep up to 200 cows and where the average milk yields amount to 7,500 kilograms, and the yields from certain cows exceed 10,000 kilograms. The managers do not consider that the average level of milk yield that has been reached is the limit and they want to raise it to 7,000 kilograms and more. Many farms of Czechoslovakia raise local cattle which can be called cattle of the first generation. The maximum milk yields from these cows are up to 5,000 kilograms, and the optimal amount of yields, when one uses the smallest amount of seeds, is 2,800-3,100 kilograms. The cooperative has refrained from keeping this kind of cattle. They have acquired and raised livestock of the second generation with maximum milk yields for the genotype of up to 10,000 kilograms and the optimal milk yield from the standpoint of expenditure of feeds is 5,000-6,800 kilograms. This way the same quantity of milk as from livestock of the first generation can be obtained with half the number of cows and with half the investments and expenditures of labor. consumption of seeds per quintal of milk here is 16-17 percent less. cooperative is changing over to the third generation of animals. I visited a farm which was constructed for importing these supercows-160 head for the The genotype of these cows, which are being shipped in from the United States and Canada, makes it possible to obtain up to 16,000 kilograms of milk per year, and the optimum is 8,000-9,000 kilograms. Here the expenditures of feeds per unit of product are reduced by one-third. But the question arises: how can one use the small number of cows of the new

generation to form a full-fledged dairy herd in a short period of time? If one waits for natural reproduction this will take many, many years, the more so since cows with high milk yields find it harder to give birth to calves and sometimes they cannot produce offspring at all.



Gross Output From Farming, Millions of Korunas

Therefore in the cooperative they have created a center for implantation. Here they remove the embryos from highly bred cows on the seventh day after fertilization and transfer it to other cows which produce offspring with the genetic properties of the highly productive livestock. Thus the cooperative not only restores its herd rapidly, but can also deliver frozen living embryos to other cooperatives at a cost of from 5,000 to 50,000 korunas each, depending on the quality. In 1985 6,000 embryos were produced and from 100 embryos they obtained 45 calves, which is considered to be a high indicator. Using implantation they obtain from each cow now five or six calves, as is usually the case, but 50 and more. The managers of the cooperative are burning with desire to contribute in this way to the overall improvement of the productivity of livestock in Czechoslovakia. The average level of milk yield of cows in the country is now 3,500 kilograms. Taking advantage of the genetic supply of the dairy herd of the Slushoviche Cooperative, in a relatively short period of time it will be possible to essentially improve the qualitative makeup of the livestock and obtain a significant increase in productivity. The automated computer system whose memory stores 42 indicators for each cow will also contribute to this. With the help of existing software here it is possible to determine in terms of various indicators the next direction for the selection of the herd and to solve a number of technological problems.

In order for the cows to obtain full-value nutrition, the cooperative has created a feed laboratory, it has its own feed plant, and in the biochemical center they produce feed supplements (lysine and others) which reduce the consumption of feeds from 10 to 30 percent.

I devoted more attention to milk production, but I was convinced that meat cattle raising was also placed on a scientific basis. The daily weight gain of cattle is more than 1 kilogram.

Like crop-growing products, milk and meat are prepared for sale here. In particular, for this purpose, using 20-ton containers that have already served their purpose, the cooperative produces large refrigeration installations in which the products are stored better during shipment. The cooperative is preparing to process meat into various meat products and intends to organize cheese production.

During the course of our discussion the biochemical center was mentioned several times. Purely externally this center, which is located in a picturesque place, reminds one a little bit of an academic laboratory and a little bit of an experimental biochemical production. It cost 40 million korunas, including its rear facilities—purification of water and air, production of steam and so forth. In the main hall there is a group of biochemical reactors whose control is completely automated. Here they develop herbicides and pesticides. For example, they spray corn with Baturin produced here so that the microbes contained in this substance will destroy the pests of corn. This alone prevents losses of up to 20 percent of the crop. To this end they are producing six kinds of ferromones—pungent substances which attract certain insects. One of the kinds of ferromones is used for protecting tree stands and the cooperative's biochemical center is producing it for the entire republic.

Along with the experimental biochemical production a building has been erected here for the actual biochemical plant costing 90 million korunas. It has practically been completed and will soon begin to operate. Its prepared products will be more than 200 tons of biochemical preparations and also 1,200 tons of lysine, which will make it possible to prepare better quality feed not only for their own needs, but also for sales to other cooperatives.

In Czechoslovakia the biochemical industry is in the very beginning of its development so the cooperative's experimental production is the only one in the country and serves as a kind of nursery for this important work. At first this area did not produce additional profit for the cooperative since it was necessary to spend a lot of money on research and reserves. Incidentally, this pertains also to the first steps of the implantation center. But the managers of the cooperative believe in the high effectiveness of biochemical production in the future. For this it is necessary first of all to double the output of the final product from each reactor, that is, to reach the indicators of the best foreign firms. To do this some of the workers of the biochemical center intend to take training in the United States. The introduction of the new biochemical plant will annually produce additional products in an amount of 100 million korunas.

Now they are also looking for other ways of increasing effectiveness. In particular, on the basis of American and West German installations the cooperative will produce a laboratory fermenter necessary in any biochemical production on a small scale for the time being (60 per year). Along with the scientists who have been enlisted workers of the cooperative have perfected

this device and attached it to a computer, making it fully automated. This device received a high rating at an exhibition in Moscow. Its cost is 1.5 million korunas. So far the need for it is not great, but according to a prediction made in the cooperative, further development of biochemical productions in the CEMA countries will require up to 3,000 of these devices. The demand for them is already increasing and the cooperative is prepared to expand their production, which will be advantageous both for the consumer and for the cooperative itself.

In the cooperative they correctly think that the basis of effective activity is a correctly arranged system of control. Each day and each hour many problems arise here which must be solved on the spot. If the managers were busy with these operational issues they would have no time left for the main thing—the development and realization of the directions of scientific and technical progress. And, after all, this is precisely the reason for the high dynamism and high effectiveness of the cooperative. In order to relieve the managers of the work of solving operational problems, the cooperative has organized a dispatcher service. The central dispatcher service is housed in a special one—story building adjacent to the administrative building. It is constructed of block-modules which are produced at the construction base of the cooperative and using these like blocks one can quickly assemble buildings for various functional purposes.

Several dispatchers headed by the central dispatcher have telephone and radio communications with all divisions and productions of the cooperative. The entire cooperative is adequately served with telephones and has 120 mobile radio stations. In particular, all work for automotive cargo transportation is dispatched here. The cooperative has 120 of its own trusts and another 80-100 trusts (depending on the season) are rented by the cooperative. The builders of the cooperative have an individual dispatcher service; control is concentrated here so that the construction sites provided with materials, construction parts and technical equipment. The dispatcher services equipped with computers and the terminals display information which is necessary for the dipatcher to make a decision.

Connected to the central dispatcher service are dispatchers from each division of the cooperative, whether it be the division for agricultural production, the biochemical center, machine building, construction and so forth. During a day from 600 to 1,000 concrete operational decisions are made in the central dispatcher service, and this means that managers are relieved of this activity and they have time for working on the future.

But in order to be at the level of the achievements of science and technology it is necessary to have sufficiently complete information about it. The cooperative has a planning and research division which includes 30 people working in the Division of Scientific and Technical Information and they provide all managers with information about what is new in the world in the areas of the cooperative's activity.

In the office of scientific and technical information which is adjacent to the central dispatcher service, there are work positions for managers and specialists. But when they come here they can take advantage of the wealth of

information accumulated in the cooperative and concentrated on microfiche. With the help of the corresponding equipment they cannot only become familiar with its information, but also copy it. In this office is also a display system which provides communications for the cooperative with the International Scientific Information Center in Vienna, which annually receives many millions of information reports and supplies them to its clients on request. Because of what has been said the managers and specialists of the cooperative keep up with all the latest achievements in their area, which also serves as a basis for making long-range decisions. One of the leaders of the cooperative, when we were looking over the Office for Scientific and Technical Information, joked: "We have as much information on scientific and technical progress as we could have if we had a scientific research institute with 5,000 associates...."

But, of course, the cooperative devotes most of its attention not so much to providing information for managers and specialists in the area of the latest achievements of science and technology, but mainly on concrete proposals associated with the application of these achievements in the activity of the cooperative. To this end, each Monday the technical council meets under the leadership of the chairman of the cooperative. It considers proposals for scientific and technical progress in each division and production: what specifically is being done and has been done, what effect has been achieved and will be achieved from this. Additionally, each manager reports here which new scientific and technical achievements have been realized during the month by the subdivision of which he is in charge. The result of such a consideration is a point evaluation of each manager from the standpoint of the utilization of technical innovations in practice. This evaluation directly influences the earnings of each manager and specialist, which will be discussed below.

In a situation of increased responsibility for the introduction of the achievements of science and technology into production as well as moral and material stimulation of scientific and technical progress, each year the cooperative realizes more and more scientific and technical measures. In 1983 it realized 46 of these measures, in 1984--118, and in 1985--the cooperative introduced about 400 scientific and technical measures, and each of them had a significant effect. Hence also the high--30 percent--annual rates of increase in production and hence also the achievement of the high level of labor productivity.

In the cooperative they correctly think that a modern direction for scientific and technical progress is the merging of industrial technology with the utilization of computer equipment. As was already said, this equipment has become an indispensable part of the production process for obtaining mineral fertilizers and chemical preparations. Calculations on computers are used extensively when analyzing soil, selecting rations for feeding livestock, solving problems of reproduction of the herd, and so forth. The cooperative attaches special significance to the utilization of computers in the process of management. On the whole it uses 70 computers, 50 of which are engaged in the process of management and used for processing socioeconomic information. And 20 computers work in conjunction with the automated system for control of technological processes and are used for engineering calculations. The

cooperative has taken on the difficult responsibility of extensively spreading the achievements of scientific and technical progress in agriculture of Czechoslovakia. And one of the most important directions here is the extensive introduction of computer equipment. But so far nobody in Czechoslovakia is producing computers that are inexpensive enough and also have a set of applied programs for solving agricultural problems, and therefore the cooperative, in conjunction with several enterprises, has arranged for the production of personal computers.

This computer is a table device for which a Czech television set is used for the display screen. The computer itself is composed of plates of European standard which are manufactured with integrated circuits produced in Czechoslovakia, and only one circuit is manufactured in the GDR. The mininum unit of this future computer includes a working memory with 64 kilobytes which can subsequently be expanded to 1 megabyte by including additional plates in the device. The computer is intended for simultaneous use of two floppy disks, each holding 256 kilobytes. The cooperative is now preparing for changing over to producing more modern personal computers in which, along with the floppy disk, there will be a hard disk that is built in—a Winchester. At the same time the floppy disks are convenient for those who wish to transfer them, exchange them and so forth. This minimum set of the personal computer costs 70,000 korunas. It can be hooked up to a large floor disk and also magnetic tape. Then the cost of the set increases to 250,000 korunas.

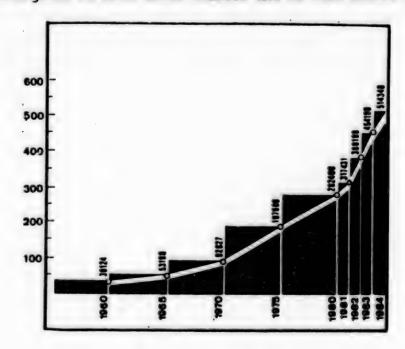
Understandably, the configuration of the computer depends on the purposes for which it will be used. But it is important to note the flexible built-in structure of personal computers. Thus the computer can be used also as a terminal for hooking up to a larger computer. The cooperative is just now doing work for joining entire groups of the personal computers it produces for organizing local networks of computers.

In a year the cooperative assembled 1,200 of these computers, a large proportion of which are intended for using agricultural cooperatives and state farms. Oriented toward this, the specialists of the cooperative are developing the corresponding applied programs which will be delivered at an additional price. The cost of the program is from 5,000 to 30,000 korunas. Examples are programs for automating bookkeeping, calculating wages, calculating the optimal ration for feeds, the optimal norms for the application of fertilizers taking the quality of the soil into account, and so forth. The cooperative has 15 of its own mathematical programmers who compile these applied programs and, additionally, about 100 programmers are enlisted from other organizations to develop programs.

In the cooperative's management and leadership they regularly follow a course toward decentralization and expansion of the rights of the departments, and within the departments—toward expansion of the rights of individual productions which are the basic cells for intracooperative planning and management. These departments and productions are guided by six basic programs of development that have been adopted in the cooperative, which embody scientific and technical progress. These are programs for industrial technology for cultivating corn, for raising highly productive livestock and increasing its productivity, for producing agricultural machines, the

biochemical program, the program for the development and application of microelectronics, and the program for processing agricultural products. These programs direct each department and each production toward the achievement of high indicators, and each manager independently searches for means of achieving this.

In the opinion of the chairman of the cooperative and the secretary of the party committee, expanding the rights of the lower managers makes it possible to overcome excessive administrative control from above. The labor collectives also have great independence. Expressing it in our language, they have a collective contract. In the cooperative this is called transferring the work positions and labor to the socialist responsibility of the collectives. For example, the hothouse has been turned over to the socialist responsibility of the labor collective. The workers servicing the hothouse conclude an agreement with the manager concerning the price of the vegetables that are released, taking their quality and the time into account. The managers are obliged to provide for material conditions for highly productive labor and the payment is arranged in percentages of the volume of sale of vegetables. And the wage fund thus formed is distributed among the workers. So it is advantageous to have fewer workers and to work harder.



Labor Productivity, in Korunas

The drivers and tractor operators take responsibility for the trucks and tractors. At the beginning of each year they evaluate the condition of the technical equipment and normatives are established for the utilization of each piece of technical equipment during the year. Forty percent of the volume of work that is done is left at the disposal of the driver and tractor operators. From this they pay the cost of fuel, spare parts, repair work, and tires, and the rest of it they receive in the form of remuneration. At the end of the year there is another technical inspection where they sum up the final total

of the annual wages, take into account the mileage, the technical conditions of the vehicles, and so forth. As a result, the drivers and tractor operators are interested in making sure that they utilize the technical equipment that has been allotted to them as completely as possible and at the same time they must reduce material expenditures per unit of labor. This explains why the cooperative reduced the proportional expenditure of fuel by 17 percent as compared to the state norms, the need for tires—by 15 percent, expenditures on repair—by 12 percent, and the labor-intensiveness was reduced by 20 percent. Additionally, the driver is responsible only for the work that is distributed to him by the dispatcher. And he displays initiative through more effective fulfillment of the assignments that he has received.

Another example. Four workers have taken responsibility for 4,500 head of beef cattle. They themselves selected a leader from among themselves and they are responsible not only for the volume of products received and their quality, but also for the cleanliness of the building and so forth. Their earnings are calculated in percentages of the products received, but they can be reduced if other conditions indicated in the agreement are not met. For example, if the buildings are not clean the central services go ahead and clean the premises, but the expenditures for this cleaning will be subtracted from the wages of the workers who have taken on the responsibility for this.

During haying groups are created which are armed with several tractors and for each one an agreement is concluded for the procurement of hay on a specific section within particular time periods. They are assigned trucks which transport the hay. From each truck they take a sample and determine the quality of hay that has been procured. Then the payment for the various degrees of quality, naturally, is greatly differentiated. In order to earn more money the labor collectives must not only rapidly procure as much hay as possible, but also be concerned about its quality. Therefore, whether it be Sunday or any other day if the weather is good and one can obtain high-quality hay, everyone is in the field where they are interested in harvesting it quickly.

The wages for managers and specialists have been arranged somewhat differently, but also taking into account the final results. Once a quarter the work of each manager and specialist is evaluated, and this evaluation is done by the higher managers for the lower ones. For example, the evaluation of a farmleader is done according to five indicators: 1) depending on the introduction of the achievements of scientific and technical progress for the past period. The corresponding points are given by the technical council of the cooperative which has already been mentioned; 2) depending on the efficiency of management; 3) on the provision for long-term development, taking into account the realization of the program; 4) the economic indicator should have been achieved—increase in production volume, labor productivity, profit, proportion of wages in products; 5) taking into account the concern for subordinate members of the cooperative (how the manager forms the living and working environment).

For each of the points in the evaluation they assign the numbers from 1 to 5 and then they are added and the average is calculated. For example, if in 1985 there was no increase in output this would be one point. If the output

were increased from 0 to 10 percent-2 points, from 10 to 20 percent-3 points, from 21 to 30 percent-4 points, and more than 30 percent-5 points. These evaluations are based on the fact that the manager should provide for development first and foremost. Lower-level workers are responsible for the plan, and it is always fulfilled in the cooperative. And the manager must exert efforts to make sure that the highest indicators are included in this plan. If the average evaluation of the activity of the worker is 3-3.5 points, the monthly earnings are established in the amount of 3,600-3,900 korunas, if it is 3.5-4 points-3,800-4,000 korunas, if it is 4-4.5 points-4,100-4,400 korunas, and if it is 4.5-5 points-the basic wage will be 4,500 korunas. Moreover, managers are paid a bonus of up to 25 percent of the aforementioned salary for achievements within the quarter. Thus the level of wages for managers, including salaries, change from quarter to quarter. If the manager has gathered less than 3.5 points in the evaluation of his work, the board and the party committee discuss whether or not he should remain a manager? As a rule, this manager is transferred to a lower position. ones who have excelled are given moral incentives, and in the plant newspaper they publish his portrait with a description of the results that have been achieved.

The managers of the cooperative think that the system that has been created guarantees development and there is constant search in the area of scientific and technical progress. All motivation for labor is basically directed toward this. With this approach the ones who remain in management positions are those who display initiative and creativity, have the desires of an indicator, a kind of a "sporting spirit," as the chairman of the cooperative has put it. On the farm there are now a total of 360 people with a higher education.

Attention is drawn to the extremely low proportion of wages in the overall expenditures: only 6.3 percent as compared to 15-25 percent on other cooperative farms of Czechoslovakia. Such a low percentage of wages shows the high labor productivity and the deliberately restrained growth of wages as compared to productivity. The average wage in Slushoviche is 2,960 korunas a month and this is much (approximately 10 percent) higher than in the neighboring cooperatives. The difference in payment is something else: in Slushoviche the wages are greatly differentiated around the average. While in other cooperatives the differences amount from 2,000 to 4,000 korunas and the average is 2,700 korunas a month, the wages here range from 1,200 to 7,000 korunas per month.

The chairman of the cooperative is convinced that the motivation for labor can by no means be reduced to interest in higher wages. He has his own philosophy about this. "Under capitalism," he says, "the coercion to work is brought about by two circumstances: the fact that labor is the means of existence for each worker and he must work in order not to be unemployed and remain without a means of existence. Additionally, there is the principle of interest in the results of labor in order to earn more and obtain more benefits. Under complete communism, as we know, needs will be satisfied regardless of the labor, that is, the labor itself becomes free of charge, but in the labor man manifests his social activity and each one will try to give the society a maximum of that of which he is capable; labor is transformed from a compulsory matter into a need, and people experience joy from labor. Thus today under

socialism the effect of factors of interest inherent in capitalism are gradually weakening and the effect of factors of the future communist society are growing. On this basis Slushoviche tries to utilize all factors as a motivation for labor.

The wage fund in the cooperative is formed according to the residual result principle. After accounts are settled with the state from the gross income and its own funds are formed for development, social and cultural measures, the reserve fund and so forth—the wage fund remains. The cooperative uses significant amounts of money for social security for the elderly and also for organizing recreation for members of the cooperative. I visited the recreation base. It has seven tennis courts, a dam has formed a picturesque lake, a swimming pool has been constructed for children, and a hotel for 150 rooms is being constructed. The plans include the construction of a ski run with a lift and so forth. The cooperative helps its members to improve their living conditions and many workers have individual comfortable homes with all the conveniences.

All able-bodied members of the collective are obligated to work and are kept under strict discipline. For people of working age nothing is given for free --everything is for payment. Rolls and milk are delivered to the work positions in the morning, the cooperative has organized a laundry, and so forth, but all this must be paid for.

The labor of each worker is highly facilitated with technical equipment and in order to have high labor productivity high technological and labor discipline must be maintained at all times. In Slushoviche it is unthinkable during the work day for a member of the cooperative, for example, to drink the beer which is so loved in Czechoslovakia. The fine for this is 500 korunas and if the manager of the guilty party has concealed this fact and has not imposed the fine, he, in turn, pays a fine of 1,000 korunas. Moreover, he can simply be fired for such a flagrant violation.

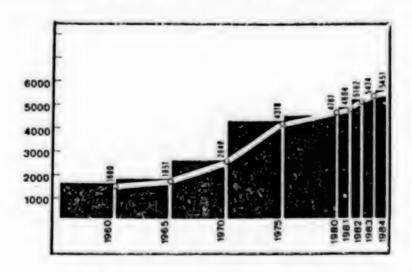
Much is being done so that members of the cooperative are proud of their collective. Of course their main price are the labor results themselves. At the same time, the cooperative keeps jumping horses and it has a hippodrome where on certain days up to 4,000 spectators gather and, with the participation of other collectives, they have horse holidays at which representatives of Slushoviche are frequently prize winners. The cooperative's car racers have won many times in very prestigious races, including international ones, and the winning car is also one of the symbols of this cooperative.

In a word, it is not just a matter of wages that motivates members of the collective to work at full force.

The high labor productivity in this cooperative has been achieved, as we can see, not as a result of additionally increasing wages, but mainly through technical innovations with sufficiently high material and moral stimuli. This is shown by all indicators of economic activity. The cooperative's fixed production capital is worth 750 million korunas so that the output-capital ratio per 1,000 korunas is now more than 3,000 korunas. This is 2-3 times as

high as in other cooperatives. As has already been said, the level of productivity here is sometimes 5 times as high as the average for the country. This circumstance must be especially emphasized since there is the idea that with the utilization of the achievements of science and technology, the increase in labor productivity is achieved as a result of increasing the capital-intensiveness of products. In reality this is not so. Effective technical innovations related to revolutionary changes in technology usually bring about a simultaneous increase in the output-capital ratio and an even greater increase in labor productivity. One can become convinced of this once again from the example of the Slushoviche Cooperative.

The cooperative does not set maximizing profit as its only goal. It tries to put all the other funds to work at once in order to create a reserve for future development. At first large technical innovations do not produce any significant profit. As has been said, this pertains to the biochemical center and the center for implantation. Now the cooperative is investing significant amounts of money in biotechnology without receiving any effect from this yet. In the agricultural school in Prague a modern genetics laboratory is being constructed at the cooperative's expense. This is being done in Prague because eminent specialists are there who can be in charge of this biotechnological direction. In parallel a similar laboratory is being constructed right on the cooperative. They have in mind organizing close interaction between the two laboratories and extensively utilizing in the cooperative the results of the achievements in the area of biotechnology.



Milk Yield Per One Cow, in Liters

The cooperative has established direct contact with economic organizations of Gotvaldskiy Rayon in Kharkov Oblast of the Ukraine. Technologies for implantation of livestock is being sent to the Kharkov Breeding Farm. In particular, under a policy of cooperation this breeding farm is receiving the corresponding laboratory installed in a bus. Several specialists from the cooperative work in it and the Kharkov comrades are taking training in the cooperative's implantation center. Measures are also being prepared for spreading industrial technology for the cultivation of corn which is applied

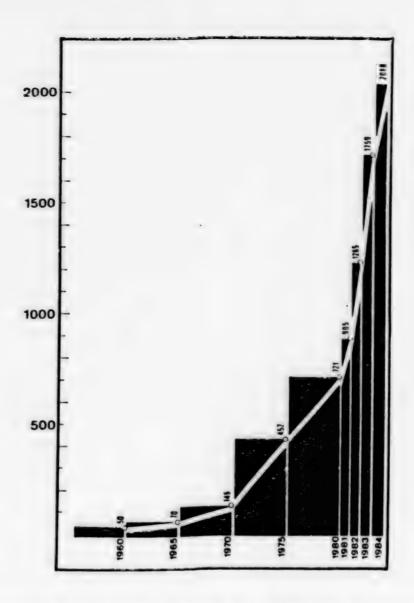
in the cooperative to the farms of Gotvaldskiy Rayon in Kharkov Oblast. This exchange of experience has been organized on a party basis and it is under control of the cooperative's party committee.

Now is the time to say that the cooperative has 420 communists and 60 candidates for membership in the party. The party accepts 20-25 people each year. The cooperative has organized 18 local party cells. Once a quarter they hold a party and economic aktiv meeting and meetings of the party committee are held twice a month.

I have tried as best I could to describe the experience of Slushoviche with which I am personally familiar. It is interesting to note that this cooperative is not part of any experiment. No special management conditions have been created for it. Like all the others, it is under the jurisdiction of the rayon agricultural administration and lives according to the same general law of Czechoslovakian cooperatives. At the same time, this cooperative is quite unusual and its activity goes far beyond the customary framework. This is why it is interesting.

In Czechoslovakia I heard the most varied opinions about this cooperative and not only average opinions. Some people spoke about it enthusiastically, with excitement, as an organization of the future, while others, on the contrary, spoke about the fact that this cooperative is not doing its own work, that scientific organizations should handle scientific and technical progress, the chemical industry should produce fertilizers and so forth.

This cooperative's relations with individual workers of higher agricultural agencies are rather complicated. Like any other cooperative it receives from the rayon agricultural administration a plan in the form of the volume of state procurements of grain, meat and milk, the proportion of the wage fund in the overall volume of products that are produced, the limit on personnel, the amount of bonuses for management and a limit on capital investments. The cooperative greatly overfulfills plans for procurements, it has the lowest proportion of wages in the volume of products produced among cooperatives of Czechoslovakia, and it is not trying to increase the numbers of its workers. But it always has disputes about the low limits on capital investments. amount of them the cooperative receives is 30 million korunas a year as a result of the equalizing distribution, and it needs 120 million korunas in order to fulfill its scientific and technical program alone! In order to find these funds it is necessary to reduce current material expenditures even more and to carry out construction as a result of current funds. The cooperative is regularly criticized for this. The numerous commissions for inspecting activity do not pass it by. In 1984, for example, the cooperative was inspected 96 times! For the conditions of Czechoslovakia this is a fantastically high figure. Incidentally, we have become accustomed to a figure like this; certain of our enterprises are also inspected many times a year. The cooperative has been forced to maintain seven highly skilled legal experts who checked on strict observance of all the legal norms within the cooperative and can give qualified answer to all the remarks and suggestions that arise during the course of inspections.



Dynamics of Production Volumes of Slushoviche Cooperative, in Millions of Korunas

The Slushoviche Cooperative is directed toward the future. I asked its leaders a question: how do you imagine yourselves in the years 1990 and 2000? The result of the year 1990 are already sketched out in the programs of the cooperative. In 1986 they plan to surpass the 4 billion mark in the production of products, and the task for 1990 is to reach an annual production volume of 10 billion korunas, mainly as a result of scientific and technical progress. The cooperative is striving to eliminate manual labor completely in animal husbandry and to change over to tending the animals with robots in manipulators, and at the same time to achieve much greater productivity of the livestock and a reduction of feed per unit of output. In crop growing the managers of the collective think that the agricultural work could be done with powerful technical equipment in one or two days at the most favorable time. Then the crop would not depend at all on the weather. In their opinion, in the future the cultivation of the fields will be done by technology that does

not involve human beings. Along the edges of the fields there will be comfortable cars with control panels and from these the operators will control the technical equipment, which will do the agricultural work without man's participation.

The leaders of Slushoviche, of course, understand that they long ago outgrew the framework of the regular cooperative. They have now developed and the ministry is considering a plan for transforming the cooperative and creating an agroindustrial combine on the basis of it while retaining the cooperative basis.

Workers of the cooperative are analyzing in depth not only their own experience in applying modern technology in other cooperatives in state farms, but also the corresponding experience of other socialist countries, particularly Hungary, where high results have been achieved in agricultural production (the experience of the world-famous Babolna concerning industrial methods of poultry raising and so forth). They are also vitally interested in Soviet advanced experience, which has been accumulated by our best sovkhozes and kolkhozes and also agricultural science. And to this end they are planning a number of trips to our country. After the high-level economic conference of the CEMA countries the management of the Slushoviche Cooperative made a suggestion concerning the creation of an international and cultural association of advanced agricultural enterprises of the CEMA countries which could provide for exchange of scientific and technical achievements and extensively introduce these achievements into agricultural practice. In particular, they could discuss the exchange of fertilizers, seeds, advanced equipment, biochemical preparations, embryos of highly bred animals, technological methods and so forth.

The experience of the Slushoviche Cooperative is of great interest. Management agencies of the CSSR are supporting this labor collective in its undertakings. The cooperative was awarded the Order of Labor for the high results of its work.

One would think that the experience of this collective, mainly in extensively utilization of scientific and technical achievements in production, is of serious interest for economic organizations of our country as well.

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#### HUNGARIAN EXPERIENCE IN WAGE REGULATION REPORTED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 8, Aug 86 pp 169-185

[Article by A. V. Polyakov, Institute of Economics of the World Socialist System of the USSR Academy of Sciences (Moscow) and A. N. Shaposhnikov, candidate of economic sciences, Institute of Economics and Organization of Industrial Production of the Siberian Branch of the USSR Academy of Sciences (Novosibirsk): "Experience in Regulating Wages in Hungarian Industry"]

[Text] Distribution according to labor is a fundamental principle which lies at the basis of ideas of social justice and at the same time is an important condition for effective functioning of production under socialism. A violation of this principle leads to unjustified redistribution of part of the product earned by certain workers to the advantage of others. Moreover, a deviation in the direction of equalizing distribution can reduce interest in the results of labor. Workers can shift from the active point "maximum income for better and better results and quality of labor" to a passive orientation of "minimum labor expenditures for a fixed income."

Observance of the principle of distribution according to labor has always been one of the major tasks of the socioeconomic policies of all communist and workers' parties of the fraternal socialist countries. Constant improvement of the mechanisms for distribution according to labor which is adequate to the changes of social and economic tasks and conditions of management is a necessary requirement for successful development of the society. Interesting and instructive experience in this connection has been accumulated during the course of the economic reform in Hungary.

Hungarian scientists and practical workers who participated in the beginnings of the 1968 reform have considered consistent observance of the principle of distribution according to labor as one of the central tasks for transforming the management system. Its crucial nature was determined by the fact that in Hungary at that time there was a strengthening of the undesirable tendency toward equalization of distribution, and thus toward a weakening of the production activity of workers in the basic work position and a strengthening of unregulated secondary distribution of incomes through rapid spreading of various forms of additional earnings, additional employment and so forth.

From the middle of the 1950's until the middle of the 1960's the system of distribution of earnings primarily served the purpose of maintaining full employment under the conditions of the release of mass contingents of the labor force from agriculture and maintaining substantiated proportions between the increase in wages and labor productivity so as to provide for a correspondence between commodity supply and effective demand. This inevitably left its stamp on the mechanisms performing the wage funds of the branches and enterprises. It created a certain stereotype of the attitude toward labor which is one of the production forces. Thus the indicator of the average earnings was planned centrally for the enterprises, practically without any coordination with the results of economic activity, the effectiveness of the utilization of resources and so forth. This method actively stimulated the so-called "effect of absorbing less skilled labor force." In order to hire highly skilled (and highly paid) workers the enterprise had to find (and did find) the possibility of hiring low-paid workers in a quantity necessary for maintaining the indicator of the average wage at this same level.

One notes that the high degree of sensitivity of the regulation of wages to the structure of the employed labor force brought about an unfavorable effect in other elements of the economic mechanism as well. For example, the enterprises were less interested in introducing new technical equipment for this required additional highly skilled personnel.

At the same time in the Hungarian economy the following type of economic behavior of enterprises developed and assumed stable forms. Encountering no effective limitations on the system of control, they strove to increase the volumes of resources drawn into production (especially capital investments), regardless of the effectiveness of the already existing potential. The enterprises created more and more jobs, to which they were motivated, in addition to everything else, by the directive system of regulating the average wage level. Moreover, many other interests of the enterprise required the largest possible reserve of labor force. In this situation there was an inevitable strengthening of the equalizing distribution of wages since a certain part of the earnings which actively influence the labor force were redistributed in favor of the "reserve" which had not worked for the part of the overall wage fund it received.

At the same time the attention of scholars has been focused mainly on those shortcomings, which were the direct result of the directive nature of the system for regulating earnings. It was assumed that the changeover from directive to indirect regulation of wages in and of itself would eliminate the basis for "equalization." And having been given greater independence in decision making, the production managers would strive to realize the principle of distribution according to labor more consistently. A certain role in the formation of this point of view was played by the position of the managers of the enterprise-they were in favor of better substantiated differentiation of earnings. The main reference point for the operation of the enterprises was considered to be profit, and it was suggested that the new system of material incentives be constructed on it. In this system of incentives the savings on expenditures (and earnings are a part of them) were considered to be an important interest of the collective, in keeping with which it was Thus it was disadvantageous to have an inactive reserve of labor force.

suggested that the changeover to economic levers of regulating wages in totality with other transformations of the economic mechanism would lead to better substantiated observance of the principle of distribution according to labor. But these expectations were not to be completely fulfilled.

On the whole the 1968 reform was conducted fairly consistently. The managers of enterprises and subdivisions were given considerable freedom in differentiating earnings. The directive regulation of wages and profit was eliminated and the rates of their increase became the major source of payment. It would seem that obstacles on the path to distribution according to labor had been eliminated. Nonetheless the equalizing tendencies continued to grow stronger. Thus the indicator of differentiation (the ratio between average levels of payment for high-paid and low-paid workers) during the years after the 1968 reform continued on the whole to decrease. In industry it decreased from 1.87 in 1970 to 1.81 in 1978.

This tendency developed after 1978 as well. According to an estimate of the Hungarian Ministry of Labor, within the framework of the majority of professional groups the amount of differentiation of earnings, as a rule, is 30-35 percent of the average wage. Most of the latter is determined not by the level of the productivity of the worker, but by other factors. A predictable question arises: Why did the production managers not take advantage of the right granted to them to increase the differentiation of earnings in keeping with the labor contribution and why have the equalizing tendencies continued to grow stronger?

For an answer it is necessary to take a broader look at certain elements of the economic mechanism—both those which directly comprise the mechanism for regulating wages and those that are beyond its framework but exert a strong influence on industry's demand for labor force.

The degree of shortage of the labor force depends basically on the ratio between the increase in the number of workers and the number of jobs in the national economy. The growth of the labor force in Hungary during the 1970's was very small, and during that time (10 years) the increase in the number of people employed in the national economy amounted to less than 2 percent, and in material production there was even a certain reduction of employment. At the same time the number of newly created jobs here continued to grow intensively. Thus in 1983 alone industrial enterprises planned the increase in the number of jobs at 20,000, while the actual number of people employed decreased by 35,000.

Thus the existing system of management creates in the management of enterprises the desire to increase production capacities and the number of employees regardless of whether or not they will subsequently be able to fill the jobs they have created with workers. Moreover, sometimes the vacant work positions serve as a substantiation for the needs of the enterprise for additional capital investments for automation and mechanization of production. But, having received them, the enterprise sometimes again uses them for further increasing the production potential and the number of jobs. Thus they create a shortage of labor force which essentially could be more correctly called a relative surplus of jobs.

Under the conditions of the shortage of labor force (which is also gradually becoming more critical) the enterprises do not try to relieve themselves of it if at some point there is a relative surplus. Moreover, without any possibility of sharply increasing the number of employees, the enterprises are interested in "storing up" a reserve of working hands in the event of the introduction of new capacities, favorable market conditions and, on the whole, for covering fluctuations in the intensiveness of production during the course of the year or quarter. Incentives for this kind of behavior on the part of the enterprises were not fully eliminated by the new economic mechanism in Hungary either. With this kind of motivation the enterprises regulate wages primarily through a relative reduction of the higher earnings. They strive to maximize the number of workers (of course, within the framework of the planned assignments, limitations and conditions). The "surplus" of the wage fund can be used for enlisting new labor force.

But the desire to create a reliable reserve of labor force leads not only to a reduction of higher earnings, but also to an increase of lower ones. This is related to the competition that arises among enterprises because of the need to attract labor force. In order to retain the existing workers and attract new ones, it is necessary to provide for a certain level of earnings, below which a worker cannot be paid regardless of his labor contribution—after all, there are many vacant jobs at other enterprises which provide earnings that are no less than the given level. Thus the desire to obtain additional labor force "raises" the lower limit of differentiation of the wages, forcing the management of the enterprises to search out the money necessary for this, including by continuing to lower the upper wage level.

The structure of the trained and available labor force has also distorted the effect of the principle of payment according to labor in the direction of reducing the overall differentiation of earnings. Thus the structural imbalance of jobs and labor resources was manifested in the 1970's in the critical shortage of people employed in heavy, less skilled physical labor and the surplus of workers in highly skilled mental and engineering labor. This also led to a reduction of the wages of skilled engineering personnel and an increase in the payment to less skilled workers engaged in physical labor. Thus while in 1970 the average earnings of an engineer were 151 percent of the average earnings of an industrial worker, in 1978 this indicator decreased to 139 percent. According to estimates of Hungarian specialists, the average engineer caught up with the average worker in terms of the amount of total income in 1970 at the age of 36 years, and in 1980 this point was moved forward to 40 years.

The interaction between the shortage of labor force and the system of distribution of earnings described above makes it possible to draw the conclusion that it is wrong to think that overcoming the imbalance in the economy in the sense of providing labor resources for jobs is dependent on the consistency and effectiveness of measures for differentiating wages. Apparently, on the contrary, the lack of a critical shortage of labor force is a necessary condition for realizing the principle of distribution according to labor. An imbalance in this area can create for the enterprises interests in the area of distributing earnings and utilizing labor force which are achieved

only with the help of reducing the differentiation of wages. It seems to us that further analysis will provide an additional confirmation of this thesis.

The Mechanism for Regulating Wages in Hungarian Industry

Its basic feature right up until 1983 was the existence of levers which firmly set the upper limit on increasing wages. But a large part of the increase within the framework of this limit was guaranteed regardless of the results of the activity of the enterprise. The permissible growth of the wage fund in excess of the guaranteed growth was provided for enterprises with a stable increase in profit which was not at a very high level from year to year. Any additional increase in profit and profitability in excess of this level did not produce any increase in the wage fund—the sharply increasing progressive tax which limits the growth of the latter went into effect.

This system of regulating the wage fund did not interest the enterprises in maximally increasing the profitability of production (that is, all other conditions being equal, it strove to achieve some fixed growth of profit without using all of its capabilities). With this mechanism of regulation the enterprise did not strive to put to work reserves for increasing the activity and results of labor related to increased differentiation of payment for it (the more so since this was fraught with conflicts which we shall discuss below). Thus the Hungarian enterprises ended up in a bipolar system of incentives: regulation of wages was directed toward "economical" disclosure of reserves for increasing profit, but a large proportion of these elements of the economic mechanism directed the enterprise toward increasing profit.

This system of regulation was "transmitted" by the management of the enterprises to the internal subdivisions (individual enterprises in trusts, shops, sections and so forth). Each shop received an increase in the wage fund only under the condition that there was a stable annual increase in profit (or its analogue) even with low overall effectiveness of the work. This, naturally, also led to the concealment of reserves, the lack of desire to increase the output norms, and so forth. Under these conditions (one must not forget the competition between the shops for labor force) norm-setting for labor (which since 1968 has been within the competence of the managers of enterprises, became an important lever in their hands. As Hungarian economists note, the wages were not a function of the degree of fulfillment of the norms, but the norms were constructed in such a way as to provide for the required level of wages and an increase of the wage fund.

One must also take into account that initially the enterprises had differing amounts of means of production, which could not but be reflected in the formation of profit and, corresponding, the wage fund as well. It is clear that to a large extent this inequality arises not because of the incompetence of certain managers or the lack of desire to modernize production, but from the objectively formed division of public labor and the conditions for the development of production.

In this situation the mechanism of regulation described above inevitably gives rise to differentiation of earnings which does not depend on the labor efforts of the collectives. The managers and workers of a number of enterprises get a

feeling of "social restriction" and, as a result, they have a desire to equalize earnings. This desire, as a rule, receives support from management agencies and is manifested in various references in planning the wage fund and subsidies to profit. As a result, countermeasures of differentiation are created. Sometimes they not only eliminate the unjustified differences in wages, but also create a tendency toward more and more equalized distribution of the incomes of enterprises.

In the second half of the 1970's these countermechanisms practically suppressed the points of the 1968 reforms that were directed toward differentiation of incomes of the enterprises in keeping with the results of their work. Suffice it to say that during these years three-fourths of the income of the wage fund in the Hungarian National Economy was provided through channels which did not depend at all on the results of the economic activity of the enterprises (guaranteed increase in wages, preferences in wages).

All this confirms the thesis that the tendency toward leveling differences in wages is "partially a reaction to the inevitability of differences in the labor contribution of the worker because of the unequal distribution of means of production, which does not depend on him, when they are used directly in the process of labor."

The possibility of extensively utilizing benefits and subsidies for augmenting the wage fund received another strong reinforcement in the 1970's. is that relatively small and medium-sized enterprises were capable of utilizing the favorable possibilities of the economic mechanism most rapidly and effectively. They could rearrange and reequip production more rapidly, they could react more efficiently and flexibly to changes in market conditions, they had greater freedom in selecting clients and suppliers, they operated more profitably, they increased profit more rapidly and, consequently, they were able to provide their workers with better wages. Because of many factors, the larger enterprises could not take advantage of the new conditions and possibilities of management to the same degree, which weakened their positions. Earnings at the industrial giants, which largely determine the country's economic development, increased less rapidly, which caused a dissatisfaction among their collectives and managers. authority and special significance of these enterprises for the Hungarian national economy led to a situation where this issue was given special consideration at a plenum of the Central Committee of the Hungarian Socialist Workers Party in November 1972. By decisions of the plenum 50 large enterprises were provided with special provisions in the area of wages for their collectives.

A serious consequence of this decree was the tendency toward consolidation of enterprises by merging them, primarily by having large associations absorb small enterprises that were of local significance. The centralization of production without concentration led to the appearance of extremely inflexible, self-sufficient trust organizations which sometimes encompassed entire branches of industry. The cost-accounting independence of individual subdivisions of the giant enterprises weakened. This could not but be reflected in the formation of material incentive systems within their framework—these acquired many of the features of equalization distribution.

In the system of distribution of earnings within the framework of the Hungarian economic mechanism there still remains one more contradiction which also contributes to reducing the material incentives of the workers. This is the level and dynamics of the wages of economic leaders. For more than 10 years now the growth of the basic wages and the general earnings of the management level of the enterprises has proceeded at half the rate of the growth of the average payment for labor in the Hungarian national economy. By the beginning of the 1980's a situation arose wherein the wages of the director of a small or medium-sized enterprise were lower than the wages of the skilled workers.

The low material estimation of the activity of the managers of production not only reduces their interest in the results of labor. In essence, this is an important way of limiting the differentiation of earnings at the enterprise since it plays the role of the upper limit of earnings. This situation also leads to equalization since the wages of a worker at a level that exceeds the earnings of the director (even if these earnings correspond to his labor) looks like a recognition of his greater role in the successes of the enterprise. In a situation where the level of earnings of the workers is determined at the enterprise by the manager himself, this greater amount is not a frequent phenomenon for in it the managers correctly see an underestimation of the role of their labor. This pertains to an even greater degree to engineering and technical personnel of enterprises.

Among the factors that lead to a leveling of differences in wages in Hungary one cannot but recall the growth of retail prices which in recent years have reached the level of 7-8 percent per year. In this situation the growth of the real earnings initially slowed down sharply, and in 1982-1984 even decreased somewhat as a result of the accelerating growth of prices. The need to compensate for this growth also led to a situation where a guaranteed rate of increase in wages became entrenched in the practice of regulating the incomes of enterprises. It is especially high for the lowest-paid groups of workers. As a result, the lower limit of earnings of these groups is increasing, regardless of their labor contribution and, consequently, all other factors being equal, it reduces the possible scope of differentiation of the earnings.

Thus the experience in improving the economic mechanism in Hungary has shown: in order to regulate the distribution of incomes in industry, it is far from enough to grant the managers of enterprises freedom in making decisions. This does not necessarily mean that they will strive to establish better ratios in the payment for labor. The latter are possible only under the condition that the active incentives for labor through its payment depending on results will not only contribute to certain interests of the enterprise, but will not sharply contradict its other interests. It seems that the principle of distribution according to labor can be manifested most completely with the observance of the following four conditions.

 The economic mechanism motivates the enterprise to effectively utilize the labor force without creating an interest in increasing the number of jobs regardless of the possibilities of providing them with labor force.

- The enterprise receives a wage fund only in keeping with the results of its labor. This places serious demands on the system of price setting: it must not have rigid restrictions from above.
- The management of enterprises has a possibility of independently regulating the distribution of earnings within the enterprise.
- 4. The interest of the enterprise's collective as a whole and the personal material interest of its leaders in establishing differentiation of wages according to labor essentially increases the "antistimuli" which inevitably arise this way.

The first three points have already been substantiated in the preceding text, but the fourth requires additional commentary. The fact is that payment in keeping with the results of labor requires a different kind of differentiation of earning from the one now in effect in Hungary, that is, the differentiation should change. This inevitably leads to increased conflicts in production management.

In the first place, the worst workers, punished by the ruble, try to prove the injustice of this punishment mainly by blaming the managers and looking for shortcomings in their work. In order to straighten out the conflict trade union and even party agencies are frequently involved, which takes a good deal of time, effort and nerves. As a result the managers can develop a negative attitude toward the utilization of the principle of distribution according to labor.

Second, there is an increased possibility of conflicts involving the best workers. Their labor becomes more difficult and each mistake in management is more clearly reflected in their work (and in their earnings). This increases the demands made by high-paid personnel on the effectiveness of production. The totality of the actions of those who have been unjustly treated can create the impression that the managers are actually work worse (although in reality the situation can be exactly the opposite). There is a real danger that the manager will receive a negative evaluation of his activity from the higher managers and organizations.

In the third place, the payment for workers in mental labor is complicated. To give them better incentive for their work means to give them incentive to eliminate existing shortcomings, that is, to reveal and make them an object of cost and consideration and to study their causes. And the causes lie partially in the shortcomings in the work of the higher manager. But it is precisely the latter who has the right and the opportunity to organize the work of his subordinates in a different, more productive way, stimulating good performance of it by increasing wages. Is the manager interested in providing material incentives for searching out shortcomings (including in his own work) and is he interested in activating and enlivening the work of the collective of which he is in charge when it will be considerably more difficult to control it then? The "antistimuli" are fairly significant and therefore the stimuli (including material ones) to differentiate wages in keeping with the results should be stronger. Here it is important how the system of material

incentives for the higher management of the enterprise and its subdivisions is arranged. Apparently it should be linked to increasing the most important indicators of the effectiveness of production.

# A New Model for Regulating Wages

The analysis conducted above pertains to the basic systems for regulating wages which existed in Hungarian industry up to 1983. Their excessive complexity and inadequate link with the level of effectiveness has led to the need for essential restructuring, which was conducted in 1983. Three main problems were solved:

to strengthen the link of the wage fund and its growth to the effectiveness of the work of the enterprise;

to simplify and unify the system of regulations;

to maintain a dynamic balance between the purchasing capacity of the population and commodity supplies.

A large part of the industrial enterprises have introduced a direct connection between the absolute level of profitability and the growth of average wages free of tax; the more profitable enterprises had an opportunity to increase the average wages without tax to a greater degree. There remained a rigid low ceiling of growth on wages. But now it depended not on the increase in profit, but on the level of profitability. Moreover, depending on the specific features of the branch or the enterprise itself, they also introduced certain conditions whose fulfillment additionally relieved the enterprise from paying tax. Most frequently these were indicators of the growth of product quality or increased exports. And another thing: 30 percent of the wage fund saved as a result of reducing the number of employees also went into the wage fund without taxation.

These measures became another step along the path to improving the cost accounting management of the wage funds introduced in Hungary in 1968. The new model of regulation undoubtedly made it possible to overcome many internal contradictions. It eliminated the justly criticized principle of planning the wage fund "from the level achieved" which placed in advantageous conditions of enterprises that increase the volume of their profit from year to year, even when they have a low level of production effectiveness.

The new stage in the regulation of earnings has been developing in Hungary since 1985 within the framework of the changes in the entire economic mechanism that were earmarked by the April (1984) Plenum of the Central Committee of the Hungarian Socialist Workers Party.

The basic goals of the restructuring of the system for controlling the economy are:

to strengthen and increase the central planning basis in the regulation of economic life;

to expand the independence of enterprises with a simultaneous increase in their responsibility for the final economic results;

to expand the participation of workers in production management and create more efficient distribution of the rights and responsibilities of various levels of organization and management of public production.

Realizing the principles of normative cost accounting regulation of the wage fund of enterprises will help to bring the economic instruments for management of the Hungarian national economy in line with modern requirements. They will become a stimulus for more efficient utilization of the labor force and provide for the proper social evaluation of high-quality and effective work both of labor collectives and of individual workers. There is reason to expect that they will overcome the unfavorable tendencies toward excessive equalizing of wages in the formation of proportions of earnings based on differences in the effectiveness of production. These differences, in turn, can become an impulse for redistribution of the labor force into those spheres which correspond to the future needs of the economy.

It is within the framework of these target goals that in 1985 Hungary introduced a new model of regulation of wages. It coordinates more closely the level of wages of workers (without limitations from above) with the "ability to pay" of the enterprise, that is, the amounts of its profit. The essence of this model consists in the following. From the free (remaining after the payment of mandatory tax deductions) part of the profit and also the amortization funds the enterprise forms a unified fund for incentive which can be expended both for purposes of material incentives and payment of taxes for wages, on the one hand, and for purposes of development of production, on the other. The level of annual earnings of the worker is taxed according to the following scale:

1. Level of Workers' Annual Earnings, Thousands of Forints

 Amount of Tax Paid From Incentive Fund, Thousands of Forints\*

0-24 24-36 36-48 More than 144 5% 1,200 + 10% 2,400 + 15% 37,800 + 50%

\* Amount of tax deductions from preceding pay period plus percentage of part of earnings from given pay period.

The enterprises, on the basis of its own view of the economic situation, can control the earning level without restriction. All it must do is provide for covering its own actions in the area of material incentive from the profit.

The new mechanism has important advantages over the one that was previously applied. In the first place, because of the change in the tax rates and the removal of additional limits, there are greater possibilities of interchangeability of live and embodied labor and incentives for economizing on material resources increase significantly. Thus while previously only 5-8 percent of the savings on raw and processed materials in value terms could be

used for purposes of material incentives, now this proportion increases to 40-50 percent. This is no small reserve for increasing the efficiency of management.

In the second place, as a result of the introduction of an additional line tax on the wage fund, it is possible to pursue the goal of changing the existing stereotype of "cheap labor force—expensive technical equipment." Thus one succeeds in reinforcing the motivation for efficient utilization of live labor resources.

In the third place, the principle of planning the average wage level which was used previously (especially extensively in recent years) is removed. It generated great sensitivity of earnings to the structure of the labor force and forced enterprises to take decisions in the sphere of employment that were unjustified from the standpoint of national economic interests.

Many scientists and practical workers in Hungary have linked the difficulty of the functioning of the system for distribution according to labor in industry to the fact that there are no cost-accounting principles for organization, management and stimulation of production at the level of individual subdivisions of enterprises. The internal management mechanisms at enterprises, as a rule, have been constructed without regard for the system of management of the economy, that is, any reforms have stopped "at the gates of the enterprises." The current change in all levels of the economic mechanism—planning, price setting, the finance and credit system, wages—because of the large degree of order and internal coordination will place the managers of enterprises in conditions where they will be forced to consistently increase demandingness in their collectives, to avoid equalization, and to radically restructure the system of material incentives for shops, sections and brigades.

The improvement of the control of wages in Hungary is being given the necessary reinforcement because of the development of democratic principles in the management of production. An indispensable condition for high labor activity and the effect of stimuli for labor is the expansion of the rights of the workers and collectives in controlling production. The worker must influence the state of affairs at the enterprise not only through its work, but also through control "from below" over decisions that are made. Without this condition the individual becomes an uninterested observer of the extravagance and passivity in the life of the enterprise and he gains an erroneous perception of public property as something alienated by the state control agencies. In Hungary now decisive measures are being taken for changing the principles of organization of interrelations of labor collectives, the administration and agencies of branch management and for transferring to workers or their elective agencies the right to discuss and make decisions in the area of economic and social programs of the enterprises and to select managers of economic organizations on a competitive basis.

Life dictates the need to solve more actively the problems related to increasing material incentives. From this standpoint the experience of the Hungarian People's Republic is also instructive in the area of regulating wages in industry. Its merits are far from simple and require further

research, but the logic of development of this mechanism is worthy of constant attention.

### FOOTNOTES

- Research on the reasons for this goes beyond the framework of this article; it is important for us only to state the persistence of this phenomenon, but let us point out, nonetheless, that the authority, prestige and earnings of managers depend essentially on the sizes of the enterprises just as do the possibilities of obtaining subsidies, capital investments, new technical equipment and so forth.
- Hungarian specialists have repeatedly pointed out this contradiction, which has become one of the important reasons for the delayed changeover of the Hungarian economy to intensive forms of development.
- Mikulskiy, K. I., "Ekonomicheskiye zakony sotsializma i sotsialnaya aktivnost trudyashchikhsya" [Economic Loss of Socialism and the Social Activity of the Workers], Moscow, 1983, p 145.

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## REVIEW OF "A JOURNAL FULL OF SUN"

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 8, Aug 86 pp 200-214

[Review by Yu. Nikolskiy of the magazine GELIOTEKHNIKA: "A Journal Full of Sun"]

[Text] The journal GELIOTEKHNIKA is published in Tashkent. It has been published for 3 decades already in an extremely small edition—only about 1,000 copies. The journal was intended for specialists—it contains formulas, tables, blueprints, and its own terminology, which is unfamiliar to the ordinary person. But still it deserves to have a considerably larger number of readers leaf through its pages.

How do we now picture solar energy according to the more widespread publications or when going through the pavilions of the Exhibition of the Achievements of the USSR National Economy? Perhaps first of all in terms of the solar batteries of satellites and interplanetary stations. All this is true, and in the journal GELIOTEKHNIKA one can also find articles about energy supply for space equipment (No 4, 1979, p 3) and large solar electric stations (No 4, 1979, p 73).

At one time we had the same attitude toward computers. Someone somewhere was studying them and learning to program and calculate on them. Gradually there came an understanding that everyone had to master computer equipment. There is no doubt that sooner or later such an understanding will also apply to the utilization of renewable sources of energy.

From a Solar Primus Stove to a Solar Furnace

The solar kitchen (or the abbreviation—KS) reminds one of a blossoming flower. It consists of bent mirrors—facets. The facets collect the energy into a bright solar reflection—a focus which warms a copper vessel or can. Depending on the kind of solar kitchen you have to assemble and the force of the rays of the sun, the warming instrument will be equivalent to any weak primus stove or an electric stove with the capacity of 2.7 kilowatts.

The range of solar kitchens includes five types. The smallest KS consists of three facets with a diameter of 56 centimeters. The largest consists of seven

facets that are almost a meter in diameter (93 centimeters). It is estimated that just the use of the small KS-Zf will save 430-520 kilograms of conventional fuel in a year, and the large one—1.2-1.46 tons of conventional fuel (No 4, 1977, p 88).

The specialized KS, the boiler, in the focus they install a can with thermal insulated walls and a thin bottom. It is thought that for collective utilization it is possible to increase the size of the boiler until its diameter reaches 3 meters. More than this is no longer advantageous.

In addition to the low-temperature solar installations, there are also those where the heating temperature is thousands of degrees—real smelting furnaces. They are used for obtaining especially pure metals and alloys. It is impossible to think of a more accurate method of smelting, and the solar smelting furnace is the emblem of solar technology. With solar furnaces one can obtain aluminum titanate (No 4, 1984, p 11) and crystallized boron (No 4, 1984, p 14). The installation makes it possible not only to resmelt metals and melt them in different proportions, but also to apply protective coatings. All one needs to do to do this is to place a transparent vacuum chamber in the focus of the concentrator. A number of countries are already using this method to apply coatings made of molybdenum borides, wolfrum and tantalum niobium. The coating which is 20-30 micrometers thick guarantees resistance to erosion.

#### The Hot Water Faucet

On the plots of gardening cooperatives here and there one can see a black vat. Water is warmed in it during the day and with this one can wash dishes and take a hot shower. We can assume that almost everybody knows a few things about "solar water heating." But what next?

One of the original plans was for a solar water heater for a rural bath to accommodate 40 people. It was constructed in the Dagestan ASSR in 1978. The efficiency factor of the installation is 50-52 percent, and it operates 7 hours a day. With an area of the solar ray receiver of 32 square meters and with this efficiency factor it is possible to heat 80-90 liters of water per square meter of area up to a temperature of 50-60°C (No 4, 1980, p 63). According to calculations (No 6, 1981, p 35), the average time period for recouping the costs of the solar water heater is fairly great-up to 10 or even 14 years. This depends strongly on the seasonal nature of the utilization of the system for solar heating of water and on its efficiency But the most important thing when calculating the effectiveness is what the solar heating is compared with. According to accepted methods, it is compared with heating in boilers which are heated by coal. Then the calculated effectiveness of solar heating of water is determined by the total expenditures on extracting coal, that is, those expenditures which have to be made if it is necessary to increase the extraction of coal by the quantity that is now being replaced by solar rays. One of the innumerable economic paradoxes: the effectiveness of the utilization of solar energy depends on the technical parameters of the new coal mines (and here is another paradox). has been calculated that the hot water supply based on solar technical devices for the rural population of the Turkmen SSR alone produces a savings of

200,000 tons of conventional fuel. But it is not only the fuel, but also the calculation that is conventional here. If we install hot showers in places where there were none before, we will not save anything but will simply improve living conditions. Strange as it may be, with the current policy for calculating the economic effect this is not considered to be directly effective. It has become accepted to deal with mythical savings of nonexistent tons.

How Does One Accumulate Solar Energy?

Solar energy is good for everyone. It appears of its own accord at many points; by using it we do not pollute the environment; it has a number of other merits. But there is one shortcoming—its poor reliability—and in the face of this all the rest of its merits amount to nothing. If the skies are clouded over, the solar station stands idle and waits for the weather to change. In the winter the sun has not risen far above the horizon, and below is a flow of incoming energy. But the need for energy is greater precisely when there are clouds and it is cold. With respect to many kinds of energy, to accumulate what has been obtained is practically the same thing as obtaining new energy. But with respect to solar energy this idea is more than true.

How to store up the energy of the sun is a question that has not been completely resolved. There are four basic methods. The first one is photoelectric, whereby semiconductor batteries produce electric energy which is then stored by known methods: charging batteries, turning flywheels or hydroaccumulation (that is, pumping water higher). Recently plants have appeared for solar hydroaccumulating stations (SCAES). One of these—for an SCAES with a capacity of 300 megawatts—promises a total operation of electric stations using sun and stored water for 2,500 hours a year, which will make it possible to produce 375 million kilowatt hours of electric energy (No 5, 1984, p 29). The second methods is a sort of photosynthesis, whereby under the influence of solar rays anaerobic bacteria produce methane. This gas can be stored up and utilized when needed.

Two other methods have been developed somewhat more carefully, but both are "packages" of various methods. One of the methods, the photochemical method, combines many reactions of division, synthesis and isomerization, in which energy is accumulated and raw material is obtained for the chemical industry. During the course of these reactions either organic dust is decomposed or hydrogen peroxide is obtained or water is decomposed into oxygen and hydrogen.

There are also helioaccumulators whose principal of operation is arranged totally on the laws of physics. These are quite similar to chemical accumulates, where one uses repeated smelting and hardening of thermal accumulating material (TAM). But the fact is that thermal accumulation is effective only when one begins with a certain fairly significant volume of the thermal accumulator. With small sizes of these the losses of heat increase sharply.

There are plans for combined thermoaccumulators in which through one solid porous heat bearer one pumps another melted one, whose working range

temperature is between 218 and 302°C. For the needs of a solar electric station with a capacity of 5 megawatts it takes 17,000 tons of granite with sand and 1,900 cubic meters of a liquid heat bearer. Together they occupy 21 cubic meters.

Let us recall again the commonly known accumulators of solar energy—blackened vats filled with water. It would seem that it would be possible to think of something else. But here are two directions for improvement: one is to reduce heat losses through the walls of the vat which for the ordinary water accumulated exceed 500 calories per degree of difference between the water and the environment per hour per square meter of wall. Solar technicians have determined that a system of thermal insulation could reduce this indicator to below 200 calories (No 4, 1984, p 25).

The other direction can be explained best with an elaborate example. Bukhara heliotechnicians have for a long time been investigating a hothouse within which there was an accumulator vat with a capacity of 200 liters. During the day the vat accumulated heat (3,617 kilocalories), and at night the water gave off heat. As a result, the daily fluctuation of the temperature within the hothouse smoothed out. One-third of the water was removed from the vat and the empty space was filled with shelving with sand. It was explained that this separate and yet combined system for storing heat, in the first place, was more powerful—up to 4,249 kilocalories—and, moreover, one could place plants on the shelves with the sand. The combination of the two kinds of TAM is advantageous since each of them has its own conditions for giving off heat (No 1, 1984, p 44).

Research has established that over a considerable part of the USSR the illumination of hothouses with solar rays is higher than the norm. It is necessary to open the frames and release part of the heat. Uzbek heliotechnicians cannot be at peace with the inefficiency of this generally accepted solution. For many years they have been working on a design for a hothouse with a subsoil supply of heat. The general idea is simple: under the hothouse it is necessary to make channels for pumping air from the most illuminated part of the hothouse into the shady part. The hot air passing through these channels during the day will warm the soil and the heat is pumped to the surface at night when the air temperature within the hothouse begins to drop.

But with this general schema there arise a mass of practical questions: What should the underground airlines be like, is the natural gravity enough or is it necessary to pump the air with ventilators, how does the accumulation of heat depend on the difference between the temperatures in the illuminated and shaded parts of the hothouse, how does the change in the illumination and shadiness because of the movement of the sun in the sky affect the accumulation of heat, and so forth. In order to answer these questions it is necessary to do more and more research. Karsha heliotechnicians have already learned how to store 197 gigacalories of heat a day under the hothouse, more than half of which is in a specially prepared gravel layer. This is enough under the conditions of Central Asia in December-January from 8 a.m. to 10 p.m. to store up heat and from 10 p.m. until 8 a.m.—to maintain the necessary temperature (No 1, 1979, p 54).

There is also a radical statement of the problem. What should be the design of the hothouse itself so that the accumulation guarantees normal temperature conditions (No 5, 1982, p 63)?

In some ways the hothouse with the accumulation of energy reminds one of the original heliotechnical hybrid—a hothouse combined with a poultry house. In such a structure there is also a shady part, the poultry has itself and the hotbed (heater) where vegetables and greenery are raised for feed. The hens or other household poultry take sunbaths that increase their immunity to diseases. Heating the poultry house is easier: it is sufficient if the temperature does not drop below  $10^{\rm O}{\rm C}$ . The requirements for heating residential buildings are considerably greater.

# Household Heating

Each variant of the consumption of solar energy for man's benefit has its own difficulties. Let us consider a plan which seems simple in terms of its external conditions: solar heating of a two-story building located not far from Tashkent (No 5, 1983, p 64). The first unexpected thing for us will be that a building with an overall area of little more than 200 square meters has heat losses during the worst days of up to 29 kilowatts. It is clear that even for Ukzbekistan we will need to restrict solar heating to an auxiliary role, that is, agree to have steam heating installed in our building (as in an ordinary one). Two types of heating—solar and water—for a short heating season—from November through March. Is it worth the bother? Yes, economically calculations if the price of the panels of the solar heaters does not exceed 50 rubles per square meter and the cost of heat that is produced is about 19 rubles per gigacalorie.

In Dagestan, in the village of Manas near Makhachkela, they have constructed a cottage with an overall area of 76 square meters (dwelling space—52 square meters whose need for heat is estimated at 133 gigajoules, including 96.5 gigajoules for heating and 36.5 gigajoules for hot water. The combined system of heating and hot water contains a solar installation, a boiler that operates on fuel oil (gas) and an electric heater. With these expanded possibilities, there is the task of selection: how should the water be heated? Here it is necessary to take into account a multitude of conditions (No 2, 1983, p 56). Architects are gradually beginning to create solar-heated domes. Under the leadership of Professor Yu. N. Sokolov from the Moscow Architectural Institute they have developed a unified block of a dormitory that is intended for 6-8 people. The solar system, with the collector covering an area of 27.2 square meters, saves either 1,135 kilograms of coal a year or 852 kilograms of fuel oil.

According to estimates of American futurologists, by the year 2020 35 percent of the buildings in the United States will be equipped with solar heating systems, which will make it possible to save 30 percent of the gas, 10 percent of the fuel energy of the gas, 10 percent of the fuel oil and 20 percent of the electric energy that no goes for these purposes. The prediction was made in 1973 and now it is clear that it was much too low (No 2, 1977, p 71). Considerably greater prospects are promised by developments of the Energy

Institute imeni G. M. Krzhizhanovskiy. Associates of this institute have designed systems for solar heating, of which at least two (if one can judge from articles in GELIOTEKHNIKA) are functional: a boarding house in Alushta and a hotel in Simferopol. Thus according to Alushta data, the incoming part of the thermal belts have the following structure: solar energy—63 percent, heat from the surrounding air—5.5 percent, electric energy—29 percent, additional thermal energy—2.5 percent (No 1, 1980, p 79).

From the Deserts to the Ends of the Earth

It might seem that the utilization of solar radiation is a promising thing only for the far northern part of our country, for the Central Asian deserts and for the Transcaucasian plains. But this is not true.

Yuzhgiprovodkhoz (Rostov-on-Don) has developed a field dormitory car. The car is intended for five people and each has 5 square meters of solar ray collection area. The car already has a system of water heating and therefore the sun is used in a subsidiary role. There are two variants for hooking up the solar heating to the heating system and they differ in terms of how economical they are. The hookup recommended for Central Asia is more complicated (two heat exchange coils are cut into the heating network), but it essentially reduces the expenditure of fuel. For regions of Kazakhstan, the Volga area and the Ukraine it is considered suitable to use the simplified system wherein water is pumped through solar receiving panels out of an accumulator vat. This dual method of heating the dormitory car points the way from the Central Asian heat to the moderate climate.

Following this path we encountered this system of hot water supply developed by the Energy Institute imeni G. N. Krzhizhanovskiy in conjunction with the All-Union Institute of Light Alloys. The installation, which is intended for providing hot water for a three-story facility to accommodate 100 people, was put into operation in a suburban Moscow pioneer camp near the city of Ruza (56° south latitude). The 252 solar collectors with an overall area of 176 square meters were placed on the roof of the building. Tests conducted from the end of July until the middle of August showed that during the time of sunlight the installation produces up to 540 kilowatt hours of thermal energy (this figure falls to 120 at dusk).

From the operation schedules of the system for solar heating one can see that the principal difficulty here is not that the weather near Moscow is not as hot as it is in Kyzil-Kumy. The obstacle is quite different: the system is becoming difficult to control because of the fact that with the inertia of the mass of water in the heating system there are sharp fluctuations in the influx of solar radiation. If we were speaking about heating immobile water these fluctuations would not play any role, but solar heating has to work with a system of pipes and radiators where the water is moved by the opening and closing of valves.

Finally, the most exotic application of solar equipment is the heating of mines of the Yakutiya with the help of energy from the sun (No 1, 1979, p 70). It turns out that from February through October on the surface perpendicular to the solar rays there is more radiation in Yakutiya than there is in

Georgia. According to calculations, in order to heat the air within one mine it takes a solar heater with a warming of about 2,500 square meters. Experiments at the Dzhebariki-Kay Mine near Yakutsk revealed that the efficiency factor of the installation equaled 55 percent (No 4, 1980, p 46).

# Water and Aridity

The Central Asian agriculture is experiencing a critical shortage of water; because of this, plans of various degrees of extensiveness are being generated. People are even thinking about whether or not to divert the south of the river which has already flowed into the northern Arctic Ocean. And yet there is water, saline water, which is suitable neither for drinking nor for irrigation. In order to include this water in economic utilization it must be made fresh. For this purpose it is best to use solar energy.

"Best," in turn, means "cheapest." Turkmenia is consistently conducting a program for providing the flocks of sheep with water using water lines. For example, for one southout which is located not far from Ashrakhabad, it is necessary to lay a pipe to 260 watering points. The overall cost of the pipeline netowrk is almost 58 million rubles. And if each watering point were equipped with a desalting installation, only 26 million rubles would be required. The expenditures of hundreds of thousands for each point include, along with the solar desalter, a building for the shepherd with solar heating, cooling and hot water, a water pump, a solar hothouse for year-round use and pens for the sheep. All this would comprise about 45 percent of the cost of the running water. The authors of the article from which the figures were taken do not mention the most important effect of the water desalters: they bring new water into economic utilization, thus easing the shortage.

What is the block of an ordinary solar desalter? It is a reinforced concrete trough covered on top with glass in a metal casing. The area of the glass surface of the trough is from 4 to 9 square meters. The troughs are installed on a slant oriented toward the south. In the lower part of the trough is a chute that is separated from the main container. The water when evaporating commences on the internal service of the glass, flows over it and falls into the lower chute, where it is gathered through pipes into reservoirs. In certain designs the desalter troughs are parallel to the lower chute and go into another chute where the saline water is deposited, but the principle is the same. This fairly simple device is capable of producing up to 5 liters of fresh water per square meter on hot days.

Concrete was selected for the troughs because of a lack of anything better. It has been proved that when changing over to less heat-inert material it is possible to increase the productivity of the desalters by 35-45 percent (No 5, 1981, p 62). There is, to be sure, one unacceptable aspect in the operation of the solar sesalters. The productivity declines during winter days to 0.7 liters per square meter. Of course the need for fresh water decreases during the winter, but not to one-seventh! A solution can be seen in the creation of combined desalters that utilize not only solar energy, but also natural cold. In Central Asia the minimum of solar radiation comes in January. But the combined desalter produced even more fresh water during that month than it did during July (No 6, 1980, p 60).

There are practically no hard frosts in Central Asia, but this is even good for desalting by freezing. The slower the ice formation the less the salt content of the ice that is obtained. Therefore the ice that is frozen to a temperature of  $-9^{\circ}$ C has half as much salt as ice frozen as  $-23^{\circ}$ C. In the desalter troughs they make openings so as to let the salt water out from under the ice. This is done in the morning and during the day the January sun, which cannot desalt the water by evaporation, transforms the fresh ice into water. of

## Raisins

Obtaining raisins and dried fruits is energy-intensive work. It would seem that it would not take much to spread the gathered crop out in the sun and let the sun dry it. But this method is very uneconomical: no matter what you do, you cannot place more than 15-20 kilograms per square meter. So far a carload of fruits weighing 60 tons takes 3,000-4,000. The second restriction is the length of drying. With applies this is not important for with good sun they (when they are cut, of course) dry in 3-4 days, but in order to obtain dried apricots they must be left in the sun for 10-12 days, sliced melons dry in 9-10 days, grapes without seeds--11-14 days, and the simpler kind--17-18 days. Prunes, which are the most trouble must be left out in the air for a month to dry, so since ancient times prunes and grapes have been dried in special dryers heated with wood.

Solar dryers of the chamber type are also used in the agroindustrial complex of the Central Asian republics. The fruits are placed in them on screens that are located around many axles. The screens are placed in a glass tower whose walls are not transparent. From below, through the glass, hot air is blown up. If the tower is made higher the natural pull will be sufficient. What good is the sun here? Attached to the dryer tower from below is a chamber which externally is very similar to a long hothouse. One end of the chamber is open and the other is connected by an airline to the drying tower. In the chamber the sun's rays heat the air, which is then drawn into the tower dryer.

Another direction is radiation drying. This way the fruits are placed on gridded palettes directly under the sun's rays in a hothouse chamber. The air comes in from outside to the chamber. The difficulty of the process is that at 70°C a caramel film forms on the fruit which causes its taste to deteriorate. The temperature can be no higher than this and if it is lower it is disadvantageous: the drying time is prolonged. Therefore, apparently, heliotechnicians are striving to create an effective combined fruit dryer where preliminary drying takes place in the chamber, that is, with solar radiation, and the final drying—in a tower that is ventilated with hot air (No 6, 1978, p 56). In an experimental combined solar dryer developed by an Uzbek engineer, from 96 square meters they managed to "harvest" a ton and a half of dried fruits during a season (No 1, 1982, p 62).

An interesting idea has been under development for many years by instructors and students of the Karsha Pedagogical Institute. Fruit drying in their design is combined with the hothouse. The reason for this is simple: when it is necessary to dry fruits, there is no need for a hothouse. The structure

"dryer + hothouse" can be operated year-round for one of the purposes or the other. One of these structures was constructed on the Kommunist Kolkhoz in Kashkadarya Oblast. It, like the dryer, is also combined and contains two chambers: in one of them the drying takes place under the sun's rays and in the other under a flow of hot air. Like the hothouse this dryer produces during the winter, spring and the beginning of the summer 4.5 kilograms of radishes and 14.8 kilograms of cucumbers from each square meter (No 1, 1982, p 68; No 3, 1982, p 67).

# Frost and Sun

Bradbury has a story where a spaceship is headed for the sun. The astronauts are worried about how to avoid burning up in the incinerating heat of the heavenly body. By the author's will the astronauts do not burn up but freeze in their spacesuits precisely because the system for temperature regulation malfunctioned.

The paradox invented by this famous fiction writer would be an ordinary event on the pages of GELIOTEKHNIKA where they discuss the Bukhara solar refrigerators that produce 7-8 tons of ice per day because of the heat (No 2, 1984, p 59). Even in the 1960's the Physics and Technical Institute of the Academy of Sciences of the Turkmen SSR designed an absorption refrigeration installation with a productivity of 6 gigacalories per hour. It cooled air into laboratory rooms with an overall area of 16 meters. And in 1972 near Ashkharbad they constructed a nine-apartment, three-story building with refrigeration solar installation with a productivity of 50 gigacalories per hour.

But first about the principle of how the sun makes things cold? There is nothing new here. Our ordinary household refrigerator works on the same idea. The main part of the installations for cooling the air within the premises is a solar regenerator. It is located on the southern slope of the roof and is an open trough over which a solution of lithium salts from above to below. The water evaporates into the atmosphere and the condensed and cooled solution goes into the first heat exchanger through which air is blown into the cooled premises. The cleverness of the heat exchanger is that on its path the pumped air goes over the surface of the thickened solution. In order to increase the area of contact between the air and the solution the latter is half-loaded with rotating strings of laminated disks. When going over the disks cooled by the liquid the air loses the moisture contained in it. It is concentrated on the disks and reduces the concentration of the solution. The weak solution goes through a second heat exchanger in which it cools the air circulating in the water cooling system. This system is completely analogous to the heating radiators to which we are accustomed.

The lithium chloride used in Turkmen coolers is one of the possible cooling agents. They are being studied at the Samarkand Cooperative Institute imeni V. V. Kuybyshev. After many years of research they have selected the most varied pairs of "condensor-absorber": water and ammonium, water and methalomine, lithium nitrate and ammonium, and so forth. With this selection of cooling agents they are gradually approaching their goal—the creation of a household solar refrigerator for 24-hour operation which would provide for a

stable zero temperature in the working chamber and below-zero temperature in the freezing chamber.

Of course, under conditions when ordinary refrigerators are the responsibility of such ministries as the Ministry of the Automotive Industry and others, it is awkward to demand: let a significant specialized department engage in solar refrigerators. But the problem is actually important and all kinds of misgivings must be put aside and the question must be asked: Is this really a good policy when a large-scale national economic problem is being resolved only in pedagogical and cooperative VUZes? Is it not time to address serious efforts of Soviet science and industry to the introduction of solar cooling?

## Health

It is a most interesting project to figure out how the sun affects the human health. A technical journal is not a medical one and it cannot understand why solar rays cure many diseases, for it discusses only designs and working conditions. But from indirect remarks one can see that the impulses of solar light treat diseases of the digestive organs, the skin, rheumatic, neurological and many other diseases.

The general idea of a therapeutic radiator is fairly simple. First it should gather rays in a "light spot," concentrating a 20-fold light capacity in it. Second, the "light spot" should "run" over a section of the body with a given time interval. In some ways solar therapy reminds one of acupuncture—needle pricking. Only instead of needles a bright ray of sun is concentrated on the necessary points on the body.

An especially great impression is made by the installation for solar therapy of children described in No 2 for 1980 (pp 37-38). A parabolic concentrator with a mirror area of 0.44 meters, a focus distance of 4 meters and a diameter of the focal point of 6 centimeters provides for a life capacity of almost 10 kilocalories per minute. Children with chronic diseases of the lungs are treated with the help of this installation in the Remizovka children's auditorium; 92 percent of them have had a considerable improvement of their health. The installation is simple and there are blueprints and methods for applying. Why does not every plant make such a device for its Pioneer camp?

In exactly the same way that solar rays treat man, they have a favorable effect on plants. For the national economy it is particularly effective to radiate the seeds of agricultural crops before planting. The idea here is the same: the impulse concentrated light, but instead of the sun one uses an artificial source of radiation—a xenon lamp whose spectrum is close to that of the sun. As early as 1976 130 hectares were planted in cotton with radiated seeds on the Leninizm Kolkhoz on Tashkent Oblast. The yield turned out to be 5 quintals per hectare higher than on the control field (No 4, 1977, p 65). Why is this? The germinative capacity of the seeds increases by 12-22 percent—that is one thing. The plants develop 3-7 days more rapidly than those from nonradiated seeds—that is the second thing (No 3, 1979, p 65). It has been calculated that one radiation installation costing 15,000 rubles produces an economic effect of 302,000 rubles a year. This calculation has been slightly reduced, meaning that there is a guaranteed additional yield of

3.6 quintals per hectare (No 2, 1982, p 60). Radiating seeds of another crop, kenaf, produces an additional yield of bast of more than one-fourth (No 6, 1983, p 70). And how many more crops are waiting for experiments with preplanting radiation.

# Two Remarks To Close With

Let us conclude our journey through the pages of the journal GELIOTEKHNIKA with this. Very many applications of solar energy have remained beyond our attention even if we take into account that from the very beginning we decided not to discuss space helioenergy or large electric power stations that operate on solar energy. We have not considered the deceptive but quite realistic idea of transforming solar energy into mechanical energy either. We have not even touched upon such exotic applications as drying sheepskins (No 3, 1983, p 64) or wetting and drying silkworm cocoons, where solar heating not only saves energy, but also reduces the process of drying by almost half (No 4, 1977, p 70). Nor have we touched on an application with a broader scope: thermal processing (treatment) of reinforced concrete items (No 4, 1974, p 58) or cutting alloy steel (No 3, 1984, p 73) or crushing mining rock (No 1, 1985, p 26) with concentrated solar light.

In any issue of the magazine three or four articles contain the words: "Tests have shown." They have their own indication: other efficiency factors, other designs and materials, new series of figures. But behind each test is concealed an immense amount of labor of domestic heliotechnicians. The hotter the sun the more difficult the testing. The testing grounds are located in desert areas and the busiest time of the test comes during the period when the sun is the hottest. Researchers on solar energy are like those who spend the winters in the polar areas: they work for the good of everyone.

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# IMPORTANCE OF PHYSICAL CULTURE DISCUSSED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 8, Aug 86 pp 215-217

[Article by V. M. Berlovich, instructor of the Health Group (Zhukovskiy): "Physical Culture—A Factor of Concrete Economy"]

[Text] Research conducted in recent years has shown that regular physical culture exercises along with harmonious development of the individual and preservation and strengthening of his health make it possible on the average to reduce by half the number of days of temporary inability to work, to reduce industrial and household injuries by 10 percent, to reduce labor turnover by 5 percent, to achieve a savings of labor resources, to reduce the number of situations of conflict and so forth. A rough calculation done on the basis of these data give the amount of economic losses that are avoided. They amount to 440 rubles per worker per year. This is the sum that is saved by the enterprise and state during a year for a worker who regularly engages in physical culture. Economic losses avoided because of one child who is physically fit and, consequently, becomes ill less frequently than the others as a result of the products produced by his mother amount to 250 rubles.

In places where they understand that a physical culture is an economic category they can use it to achieve a considerable reduction of illness both on the part of workers and their children. As we know, physical health work is organized well in kindergartens of Leninakan and in kindergartens of technical enterprises of Kherson, where the payment for the personnel is made directly dependent on the level of illness of the children. People are coming to enjoy physical cultural at Uralmash, industrial enterprises of Tomsk, and the Novosibirsk Electric Locomotive Repair Plant, at a number of industrial enterprises of Minsk, and the Kemerovo Azot Industrial Association. But the problem is that these are only examples and not a mass phenomenon.

"Today physical culture is not simply a social factor but also concrete savings.... Many of the young production commanders—brigade leaders and masters—already see a great economic reserve in physical culture," writes the Hero of Socialist Labor a forge operator of the Verkhne-Saldinskiy Metallurgical Association, B. Parfenov, in SOVETSKIY SPORT for 23 March 1985. "Why is the economics of physical culture not mentioned in a single textbook for the brigade leader?"

To an even greater degree then for junior production commanders knowledge of the economic effectiveness off physical culture and health work is necessary to upper level managers: workers of the Gosplan, ministries, managers of enterprises, associations and institutes, and so forth. This knowledge should be gained in various courses, in the system for increasing qualifications and institutes for improvement. Today when all production reserves must be used, each manager should do everything for correct organization or physical culture and health work in his area. Moreover, regular physical culture exercises are primarily necessary for the production commanders themselves, for the growth of the volumes and complexity of the products that are produced and the intensification of production as a whole increased their load, they are forced to work harder, and frequently they cannot remain within the time limits.

Today it is not enough for the manager simply to have a desire to improve health work. Physical culture, which seems so simple at first glance, is actually too complicated. This is clear even from a list of its components: the theoretical basis, program-methodological support, administrative-legal basis, organization, personnel, propaganda, and material-technical and medical-biological support. There has long been a need to single out physical culture into an individual branch of the national economy which is intended to render sports and physical culture services to the population. This work should be arranged on a cost-accounting basis everywhere, the more so since this experience already exists—there are physical culture—health combines in Belorussia. And perhaps some of the money which the population has lying in savings banks could be used for developing mass physical culture and for maintaining and strengthening health! One must think about how to do this.

Being one of the constituents of the sphere of nonmaterial production, physical culture in the stage of mature socialism should develop at more rapid rates than the sphere of material production. Only then will it contribute to solving both social and economic problems facing our society today.

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# DIARY OF CONSTRUCTION CHIEF INAGINED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 8, Aug 86 pp 218-220

[Article by Vladimir Essen: "Twelve Months From the Diary of a Chief of a Construction Administration"]

[Text] 20 January

They called from the trust, demanded the annual report and threatened me. The head bookkeep spent all night finishing it. Today they sent it off, but the courier, instead of taking it to the administration of the trust for SP (Wall Panels) went to the neighboring board of SP (Union of Writers).... Now the head bookkeeper is being fired because they promised to print the report in a satirical journal.

Work for tomorrow: hold operations meeting.

# 2 February

The personnel division sent a new bookkeeper—the son of the trust's manager. In any case, they made him the head one so that the position would not be empty.

Work for tomorrow: hold operations meeting.

#### 30 March

The quarter is coming to an end. Well, why are there four quarters in one year, and not the other way around! Today I had a bad dream. I was on a boat floating on the sea and suddenly I saw—a mermaid! Her tail was gold and she looked a little like Alla Pugacheva.... She came to the surface and sang: "Three wishes, three wishes...." I did not understand right away and it was not until morning that I asked for output, but she gave me the finger and dove back into the water.... It will be interesting to see if I get my output.

Work for tomorrow: hold operations meeting.

# 15 April

No output. There is a reprimand. They called from the trust. They asked why in social development we included the indicator of the number of workers we are expecting from the drunk tank. With an increase throughout the base. And why in our report is every 10th worker a—hooligan? They were the ones that asked for the undistorted data.

Work for tomorrow: 1. Issue an order to get rid of hooligans in the local areas. 2. Hold an operations meeting.

# 20 May

Unpleasantness: The commission from the rayon financial department drew up a document concerning our squandering of state funds under the item that we maintain guards for the warehouse and we pay them up to 3,000 a year. I received a reprimand.

Work for tomorrow: 1. Fire the guards. 2. Hold an operations meeting.

#### 1 June

There is no point in installing anything: without the guards they plundered the warehouse. It will be a month before the extradepartmental signalization protection is installed. I am going to go on vacation. It will be interesting to see if there is output when I return.

Work for tomorrow: 1. Issue an order concerning additional efforts to eliminate shortcomings. 2. Hold an operations meeting.

### 12 July

We celebrated the 9th day since my return from vacation. We celebrated it in glory, but there is no output for the second quarter. The signalization has been installed in the warehouse. We were given thanks.

Work for tomorrow: 1. Transfer 12,000 to the extradepartmental guard for signalization. 2. Organize a reprimand for the head engineer for output. 3. Hold an operations meeting.

# 5 August

They called from the trust. They asked how we were doing with the brigade contract. I said everything was all right. They gave us an assignment. The entire staff looked for the contract but we found only the annual report for 1913. The warehouseman set forth the hypothesis that the documents of the contract had been used for scrap paper by somebody. "Now," he says, "the book shortage involves not only the contract, but they could take away all the furniture...." We must figure this out.

Work for tomorrow: 1. Introduce the contract. 2. Notify the trust of the data concerning the increase in the indicators of the contract as compared to the 1913 level. 3. Hold an operations meeting.

# 30 September

Again the quarter is coming to an end. I had a bad dream. I was learning to dive and instead of opening my eyes under the water I opened my mouth. Such bubbles came out!... It will be interesting if there will be any output.

Work for tomorrow: Hold an operations meeting.

# 11 October

No output. A severe reprimand. A girl came from the branch scientific research institute concerning problems of the introduction of the automated control system. She hung a poster in the corridor to the effect that the introduction of the automated control system in our collective would produce an unheard of effect. All divisions gathered around her. She was very sympathetic.

Work for tomorrow: 1. Transfer an advance of 40,000 to the institute. 2. Hold an operations meeting.

#### 16 November

In the ispolkom they gave us an additional assignment for saving vegetables. The cabbage reached us. The entire administration went to the field. The chief of the sovkhoz division said that she would issue a certificate that we had harvested 4 tons of cabbage if we would bury 8 tons of frozen carrots. We worked well. Instead of dinner they sent milk from the sovkhoz. We drank a whole can of it, about which people complained bitterly on the way back. We stopped 16 times....

Work for tomorrow: Transfer 3,000 to the PATP for buses. 2. Hold an operations meeting.

# 5 December

Yesterday we released the first object for this year. A chic shop made of glass and aluminum. The planning assignment was for Sukhumi, heating with solar batteries—the last work in scientific and technical progress. We sent the plan to Chelyabinsk without going over it. The receiving commission noted that it was a little bit cold in the shop. Never mind! It is important that they accepted it. Under the next five-year plan we shall heat the premises. If, of course, they include it in the plan.

Work for tomorrow: Hold an operations meeting.

# 30 December

All night I had a nightmare. They had turned over a furnace to me. We went

inside it with the commission, everyone looked around, decided to accept it, and notified the client of this. Again we turned around to leave and the lock on the door clicked! Until morning we banged on it—they had sound insulation—Oh—oh! And in the morning we could sense that they had decided to turn the furnace on.... I woke up in a cold sweat. The end of the year. What will happen?

Work for tomorrow: Hold an operations meeting.

## 31 December

The dream did not come true. They called from the trust. They said that others were even worse and that our administration was appointed to be a leading one, that we would be the leaders of the new competition. I answered: "If necessary—we shall lead!" The plan was adjusted. They gave us a banner and a bonus.

Work for tomorrow: 1. In connection with our being appointed a leading group, issue an order concerning the elimination of shortcomings that have not yet been eliminated. 2. Hold an operations meeting....

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